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PROFESSOR OF OBSTETRICS AND GYNÆCOLOGY IN THE WELSH NATIONAL SCHOOL OF MEDICINE; OBSTETRICIAN AND GYNÆCOLOGIST TO CARDIFF ROYAL INFIRMARY

THE object of all antenatal supervision is to determine, and if possible to rectify, any abnormalities present in pregnancy, so that the intrapartum calamities of previous days should as far as possible be avoided; and it has been emphasised in many communications how, by careful abdominal examination, by pelvimetry, and by urinalysis, such abnormalities as malpresentations, contracted pelvis, and albuminuria may be detected, so that difficult labour and eclampsia, with their dangers to mother and child, may be avoided, and the general maternal mortality-rate reduced.

It is well known however that, contrary to expectation, maternal mortality has appeared to increase rather than to decrease since the introduction of antenatal supervision. Various explanations of this have been given, and it has been stated that such supervision is at present insufficient in quantity and quality, and is often carried out by those who have not sufficient obstetrical experience and judgment; while the patient is often to blame for failing to report for later examination, or for failing to carry out the treatment advised. It has thus come to be recognised that effective and preventive antenatal supervision is not the simple matter it was once supposed to be, but that it is full of problems and difficulties, even if carried out under ideal conditions. It is some of these problems that I propose to discuss in this paper.

PELVIMETRY

We have all been taught the various classical pelvic diameters at the brim, in the cavity, and at the outlet, also the manner in which these diameters can be estimated by pelvimetric measurement. But usually a number of practical points are overlooked. Thus the pelvis in the living subject, lined by the psoas and other muscles, really bears but little relationship to the dried bony specimen of the lecture room, and the various available diameters are altogether altered. The mass of the psoas muscle actually reduces the available transverse diameter below that of the oblique, so that it is usually in the latter diameter that the head engages. Clinical pelvimetry is found, in practice, to be a difficult matter, and if two competent observers were to measure the external pelvic diameters in the same patient, a difference of anything up to half an inch would be found between the two measurements, and a corresponding difference in the estimated internal diameters, particularly the true conjugate, constitutes such a margin of error as practically to vitiate the value of the manœuvre. This shows clearly that pelvimetry is essentially a personal matter, and that each individual in time comes to form his or her own mental picture of the normal pelvis; it also indicates the practical impossibility of making accurate measurements of the external pelvic diameters.

It has to be emphasised that the absolute lengths of the interspinous and intercristal diameters are usually without significance and it is surprising how frequently and how recklessly pelvic contraction is diagnosed from these measurements alone. But if they approximate, and especially if the intercristal be longer than the interspinous diameter, this is suggestive of a flat pelvis and search should be made for further indications of the presence of this condition.

When we consider in detail the measurement of the diagonal and external conjugates, the difficulties are increased. In the former case, in a nervous primipara, it may be quite impossible to feel the sacral promontory, partly on account of general rigidity, but often because of the pain caused by the pressure of the ring and little fingers of the examiner on the perineum. But if the conditions for examination are satisfactory, can we be sure that the tip of the second finger is actually touching the sacral promontory? This is far from certain, and in a great proportion of cases it is the anterior surface of the upper sacrum that is palpated, and this mistake is more likely to be made in the not infrequent cases in which the first sacral vertebra bulges forwards. Again, the point indicating the limit of the lower surface of the symphysis pubes on the base of the index-finger may be modified by the amount of fat present in the mons veneris, or by the smallest slip of the left fore-finger, and, in fact, the only cases we can be certain about are those where the pelvis is roomy and the promontory so far from the vaginal orifice that it cannot be palpated at all, or those in which there is marked contraction, and in which the promontory is easily palpable.

Consideration of these points indicates the practical impossibility of estimating exactly the length of the diagonal conjugate of the pelvis, especially in that most important class of case where only a minor degree of contraction is suspected; Whitridge Williams [1] quotes Van der Hoeven, who held that the fallacies of indirect mensuration were so great as almost to destroy its usefulness. In measuring the external conjugate the difficulties are even greater, and adiposity in the back, and in the mons veneris, may make exactness of measurement here almost impossible.

Again, the variations between the external conjugate and the true conjugate, due to variations in the thickness of the sacrum or pubes, or in the length of the fifth lumbar spine, are often so great as to make the former diameter practically useless. Williams and DeLee [2] both remark on the unreliability of this measurement in estimating the true conjugate, and the former quotes Skutsch, who found that in 100 specimens the difference in length between the diagonal and true conjugates varied from 2 to 4 inches. Now the object of measuring the external and diagonal conjugate diameters is merely to estimate from these the length of that most important pelvic diameter, the true conjugate, and it will thus be seen that such an estimate can be, at best, only a rough one, so that slight variations from the normal, such as a slight contraction, may be missed, or may be wrongly diagnosed by the ordinary methods of pelvimetry; and for this reason it is certain that in many cases minor degrees of pelvic contraction have many times been diagnosed when none existed, and unnecessary operative manipulations have been advised and performed. For these reasons A. W. Bourne [3] has recently advised the abandonment of pelvimetry, while Goenner [4] has shown that external pelvimetry alone is of little value in estimating pelvic contraction.

The most accurate method of knowing the exact size and shape of the pelvic brim is by methods of X ray examination, as practised by Van Rooy,[5] Reece,[6] and others, but it will be shown that certain definite clinical limitations apply to these findings.

DISPROPORTION

As regards the fœtal head, marked abnormalities, such as hydrocephalus, can usually be diagnosed by bimanual palpation, but our main problem here lies in the head which is not engaged, which is floating above the brim at the end of pregnancy. To regard this as always, or even usually, a sign of contracted pelvis in a primipara, is incorrect; the most common cause of an unengaged head is clinical enlargement, the most common cause of clinical enlargement is incomplete flexion, and the most common cause of incomplete flexion is a posterior position of the occiput. In other cases a relatively large fœtus and head may be present, while in many cases the conditions of pregnancy are normal, and the cause of the head not engaging is obscure; but when labour starts it engages readily enough. One could say then that demonstrable pelvic contraction is probably the least common cause of the head failing to engage before the onset of labour.

The moral to be drawn from these considerations is that in every case where the head is floating before labour in a primipara, other signs of an occipito-posterior position should be sought; and, again, that this sign, of itself, is no indication for antenatal operative interference. Failure to appreciate these points has led to the performing of countless unnecessary inductions of labour and Cæsarean sections, and this is the very type of case in which the woman may deliver herself spontaneously, after being assured that she can only be delivered by Cæsarean section.

This raises the thorny matter of slight disproportion between the fœtal head and the maternal pelvis concerning the treatment of which so many diverse opinions have been expressed. It must, first of all, be realised that the greater the disproportion, the more simple is the treatment, and, in a case of contracted pelvis with definite overlapping, usually Cæsarean section, and nothing else, is indicated. This is the case par excellence which has benefited by antenatal supervision and in which obstetrical calamities can be avoided by properly planned operation. But these cases are relatively rare, and much more often we are confronted with a case in which the pelvic measurements are estimated to be slightly on the small side, with the head not engaged in the pelvis during the last month of pregnancy. In no case is more obstetrical judgment called for; in no case are panic measures more undesirable.

Now, the mechanical factors present in any parturition are multiple, and the final result as regards a normal or complicated labour depends on a harmonious co-relationship of these. (1) The size of the pelvis is obviously one of the most important factors, and the difficulty in estimating this accurately has been emphasised; while (2) the size of the head is equally important, and again this cannot be known accurately by ordinary clinical methods. But the clinical size of the head and its relationship to the size of the pelvis can be quite satisfactorily estimated by Munro Kerr's method of bimanual pressure. (3) The third factor is the mouldability of the head to fit itself into the pelvis; while (4) the amount of loosening of the pelvic joints at the time of labour, and (5) the strength of the uterine contractions are the other main factors which govern the course of labour. It is evident then that not one of these five factors can be accurately estimated by clinical means prior to labour, and this applies particularly to the mouldability of the head which is absolutely unknowable. It is this fact that produces such a variation in the course of labour in two clinically similar cases; in one case, where the head moulds readily, labour is rapid, and in the other, with imperfect moulding, it is impacted although the actual size of the two heads may be identical.

By X ray examination the size of the pelvis and of the head may be accurately estimated, but, of itself, this may not help us very greatly, as no indication can be given of the ability of the head to mould during the forthcoming labour.* What then is the best course to follow in such a case of slight disproportion with all the factors vague? I submit that the reasonable course is to wait and see. The fœtal head has properly been described as the best pelvimeter, and it is only by seeing what the head will do in a trial labour that the case can be managed to the best advantage. If the patient is allowed to go into labour for a few hours with careful supervision, and with avoidance of vaginal examinations, my experience is that 75 per cent. of such cases are delivered normally, that forceps extraction is required in 15 per cent., and Cæsarean section in not more than 10 per cent., and since I have made trial labour a routine in such cases, my Cæsarean section rate has fallen by about one-third. Induction of labour then has practically no place in the management of slight disproportion, and unless treatment be as described, strictly on the merits of each individual case, unnecessary operations will be performed, with the inevitable associated mortality. In this connexion Wrigley [7] has estimated from his investigations of cases in various London hospitals that over 50 per cent. of inductions of labour are performed unnecessarily.

MALPRESENTATIONS

An occipito-posterior lie of the fœtus represents a very real antenatal problem, and the condition has been well described as the bugbear of obstetrics. There are no known methods by which it can be prevented, while the only method of rectification, introduced by Buist, has been a failure, and Wrigley reports that in the General Lying-in Hospital in London the number of these cases was exactly the same after the treatment was abandoned as when it was in use.

But one of the main problems here is the frequency with which the condition may be overlooked; prominence of the fœtal limbs, a lateral maximum intensity of the fœtal heart, and a high position of the fœtal head may all be present or absent in a particular case, while sometimes it is only a labour prolonged for no obvious reason, or the actual palpation of the ear when the head is low, that makes the condition manifest. It is for this reason that estimations of the frequency of the condition by various authorities have varied from 15 to 45 per cent. of all vertex cases, and it is certain that, not only are a number of cases missed before labour, but, on account of the spontaneous rotation of the head that so often occurs during labour, a certain number are never diagnosed at all. Ordinary antero-posterior X ray examination may not be of much help in this condition; only with

* Since the completion of this paper C. Nicholson has published his technique for radiographic mensuration of the pelvic inlet and outlet (THE LANCET, Sept. 12th, p. 615). This is simpler than some previous methods, and its accuracy is shown by the clinical realisation of some of the anticipated results. It therefore constitutes a real advance; but the problem of the potential mouldability of the head remains a clinical one in the slighter forms of disproportion.

the patient lying laterally can the posterior position of the spine and of the occiput be accurately seen. In this connexion Hedley [8] has reported and illustrated a case in which the vertebral column was anterior, but the neck was twisted with the occiput posterior, and it is possible that such cases may be more common than we know. The difficulty here then is not so much diagnosis, as the fact that the most commonly encountered malposition of the fœtus cannot be corrected before the onset of labour.

The breech presentation, especially in a primipara, continues to be an antenatal problem of importance. In the first place it is not sufficiently realised that the condition may be very hard to diagnose; and every obstetrician has made, and will continue to make, errors in this way.

The text-books, with their diagrams, make the matter appear too easy, and many of the descriptions are found to be considerably modified in clinical practice. Thus, with the uterine and abdominal muscles tense, it may be very difficult to appreciate the head in the fundus of the uterus, and if, as is often the case, the head should be to one side, it can easily be missed. Again, the findings in the lower uterus, when no hard head is palpable, can be reproduced almost exactly in a vertex case when the head is well down in the pelvis, and so out of reach of the abdominal palpating hands. Further, in a nervous primipara, when vaginal examination may be difficult owing to rigidity, a well-flexed sacrum may feel surprisingly like the hard fœtal head, and finally a presenting vertex above the brim, with the abdomen fat or rigid, may not be palpable from below, and so a breech is wrongly diagnosed.

While the diagnosis may be none too simple, the antenatal management may be equally troublesome. The usual advice is to perform external version about the thirty-sixth week, but there are many pitfalls here. This manœuvre should always be performed gently, and it is surprising how much more effective it is if this is remembered. It is usually easy to dislodge the presentation and to manipulate the fœtus into the transverse, but there it may stick, and I find that the main obstacle to further version at this stage is the degree to which the sacral promontory projects, and not, as is so often stated, any extension of the legs. Often, after prolonged manipulation, and when it appears as if the attempt at version is going to fail, the head suddenly slips down past the promontory to the pelvic brim.

Now, prophylactic version is an operation essentially in favour of the fœtus, and it is regrettable that, especially if performed forcibly, the fœtus may die. Thus separation of the placenta, if it should be anterior, and fœtal death with or without hæmorrhage, prolapse of the cord, rupture of the membranes, or the onset of premature labour, are all well-known accidents following version, and they all represent failures mainly due to too energetic manipulation. Again, the frequency with which the fœtus may spontaneously change its position to a breech, or a vertex, even in the last month of pregnancy, is often forgotten, and this may happen very rapidly, so that if a breech be diagnosed, and a radiogram a few days later shows a vertex presentation, the first diagnosis was not necessarily wrong.

As regards other malpresentations it has to be remembered that a face can almost never be diagnosed before the onset of labour, and that fully half of all transverse lies will undergo spontaneous rectification, or spontaneous version, with the onset of uterine contractions.

HÆMORRHAGE AND TOXÆMIAS

Antepartum hæmorrhage represents an ever-present problem in obstetrics, and antenatal examination has quite failed to influence, to any extent, the mortality-rate from this condition, because it is usually entirely unpreventable.

The association of accidental hæmorrhage with toxic albuminuria sometimes allows of its prevention, but placenta prævia can seldom be diagnosed before the onset of bleeding and can never be prevented. In some cases of central placenta prævia a sensation of there being something resistant between the presenting part and the vaginal fingers may suggest the condition, but these cases represent a very small proportion. Attempts to locate the position of the placenta by the injection of opaque material, followed by radiography, have so far been so uncertain as to be quite unreliable, but it is probable that these methods will become more exact in the future, and of correspondingly greater help. Under present conditions, with the X ray findings uncertain, placenta prævia may be wrongly diagnosed and unnecessary operations be performed in a normal case.

Albuminuria and eclampsia are as great an anxiety as ever—chiefly because we do not yet know their exact nature. It is hard to say whether the present increase in the incidence of albuminuria is real or is due to more careful antenatal urinalysis, but at least we have to confess that we can do nothing to prevent the condition occurring, although much can, and should be done to prevent the further stage of eclampsia, or of chronic nephritis, by elimination, by appropriate diet, and if necessary by the induction of labour.

Neither the incidence nor the death-rate from eclampsia have varied in recent years, in spite of the great extensions of antenatal supervision, and Munro Kerr [9] rightly stresses this as the index of the efficiency of antenatal work. There is no greater problem in antenatal work than to elucidate the causes of this failure to influence, particularly, the incidence of eclampsia; the explanations put forward, such as insufficient frequency or skill in examination, or failure on the part of the patient to return for future examination, are not quite convincing, and there are probably aspects of this condition which are beyond our present knowledge and control.

It has to be admitted also that antenatal supervision has so far failed to reduce maternal mortality, and there are various reasons for this. I have detailed the difficulties regarding the minor degrees of disproportion, and it is certain that in this way an excessive amount of unnecessary operative measures, such as induction and Cæsarean section, have been increasingly employed of recent years, each with their own mortality, so that the doleful fact emerges that a certain number of women would have been better off if they never had had any antenatal examination. Another point is that such grave conditions as toxæmia and antepartum hæmorrhage, as well as half the cases of puerperal sepsis, many cases of post-partum hæmorrhage, embolism, and obstetrical shock are absolutely unpreventable, and each of these carries its own mortality.

THE OBSTETRICAL HISTORY

A final antenatal problem lies in the difficulty often experienced in obtaining a helpful previous obstetrical history in a multipara. At first sight it would appear the simplest thing for a woman to know the nature of her previous pregnancies and labours, but in practice she often does not. Thus unimportant details may

be exaggerated out of all proportion, so that what was a normal labour may appear to have been very complicated. In cases of doubt the fate of the child and the duration of the lying-in period may be of value; if labours have been really complicated the child's life is often in danger, while any puerperal sepsis will prolong the lying-in period. Quite often there is a genuine history of several difficult labours—possibly with stillbirths—although the pelvic measurements appear normal. In such a case the whole difficulty may be cleared up by inquiring about the sizes of the children, when it will usually be found that they were large, weighing 10 lb. or more. Again there may be a history of previous forceps delivery for no obvious cause, when in fact such treatment has been applied unnecessarily; and the main moral to be drawn is that, while a previous obstetrical history, especially of normal confinements, may be of great value, it has to be weighed carefully in the balance, and one's judgment has to be formed on the facts of any particular case.

CONCLUSION

The antenatal problems here discussed by no means exhaust the list. But the consideration of them should bring home to us two important aspects of obstetrics; that the efficient carrying out of antenatal work and the forming of proper conclusions from the facts observed require long experience and mature judgment, and the more lacking are these qualities the more often will unnecessary operative interference be advised and undertaken; also that the difficulties in discovering and in rectifying many of the abnormalities commonly present in pregnancy are often very great and may be insurmountable. It follows then that the necessity for dexterity and patience during actual parturition is as important as ever, if the best results are to be obtained from the previous antenatal supervision.

In these ways the anticipations of earlier years have been rather falsified, and the necessity for efficient and practical help to the woman in her hour of need was never greater than to-day.

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EXPERIMENTAL OBSERVATIONS ON THE RATIONALE OF RADIOTHERAPY*

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AN experimental investigation into the factors determining the therapeutic action of radium on malignant tumours has led to the following conclusions.[1 2]

The regression of a malignant new growth after irradiation is the result of a complex process, and is not due to a direct lethal effect of the irradiation on the malignant cells. The process is initiated when the malignant cells have been damaged by irradiation. This damage elicits a reaction of repair beginning with an invasion of the tumour by macrophages which become gradually transformed into fibroblasts, so that the tumour is gradually replaced by young cellular connective tissue.

Malignant tissues in general are not more radiosensitive than normal tissues in general. There are malignant growths which are very radiosensitive, and there are others which are very radioresistant. There are normal tissues which are very radiosensitive, and there are others which are radioresistant.

The radiosensitivity of malignant cells is not a fixed inherent property, but can be varied within wide limits. In the absence of oxygen malignant cells become very radioresistant. On the other hand, their radiosensitivity can be greatly enhanced by inhibiting respiration either by HCN or by cold. In all methods of radiotherapy which involve the repeated application of radiation it is therefore essential that the doses given are so small that they do not permanently damage the vasculo-connective tissues surrounding the tumour. For if this happens the blood-supply to the tumour cells is interfered with and the malignant cells pass into a stage of partial anaerobiosis, which makes them radioresistant.[3] This induced radioresistance is a well-known clinical phenomenon. It is, however, not due to a direct effect of radiation on the malignant cells, as is generally believed, but results from a damage to the blood-supply.

Different types of tumours vary greatly in their radiosensitivity. Whether these differences are due to differences in the blood-supply or whether there are additional factors has not yet been decided. But it is known that normal tissues also vary greatly in their radiosensitivity and in their case it would seem difficult to attribute these differences to their blood-supply.

The ideal method of radiotherapy is one which has a selective effect on the malignant tumour—that is to say, a method which damages the malignant cells much more than the normal tissue in which the tumour grows, and in deep-seated growths the skin through which the radiation has to be applied. There are some highly radiosensitive tumours which fulfil these requirements, but for the majority of tumours, especially the deep-seated ones, the problem has not yet been solved satisfactorily, and the damage to the skin is always a factor which sets a limit to the dose that can be applied to the tumour. The conception that tumour cells as such are more radiosensitive than normal cells is not generally true and no methods are as yet available to produce such a difference in radiosensitivity.

In the course of experiments on the irradiation of transplantable tumours with non-lethal doses it was found that when irradiated cells were propagated by transplantation their growth rate and the percentage of successful transplantation are greatly diminished for a considerable period, but that both gradually return again to the normal. The damage inflicted upon cancer cells by sub-lethal doses of radium is therefore one which persists for some time, but from which the cells can recover—that is to say, it is completely reversible. The existence of this condition

* The substance of this paper was read at the symposium called by the British Empire Cancer Campaign in December, 1934.

of reversible damage is not only of theoretical interest, but is also of great practical importance in connexion with the rationale of the method of fractionate dosage in radiotherapy. It is curious to find that very little is known concerning this process of recovery in cancer cells.

Radiotherapy by fractionate dosage is based almost entirely on clinical observations in man. The rationale of such a method demands that a second dose is given before the effect of the first dose has passed off if a cumulative effect is to be obtained. It is necessary to know, therefore, the length of time over which this period of recovery extends for a given initial dose, whether it is fixed or varies with the strength of the initial dose, and whether the period of recovery is longer for malignant tissue than for normal tissues and especially for the skin. The experimental investigation of the period of recovery detailed in this paper shows that in malignant cells this period is for very small doses very much longer than in normal tissues.

The view generally held at present on the basis both of experimental observations on normal cells in tissue culture and of clinical observations in man is that the effect of small doses of radiation pass off very rapidly. It was therefore surprising to find that this view does not apply to malignant cells and that even very small doses of radiation produce effects in cancer cells which, while not readily demonstrable by morphological changes in the cells or by alterations in their growth rate, persist over a long period of time and can be made demonstrable by a cumulative action. By applying very small doses of radiation at suitable intervals it thus becomes possible to produce a cumulative effect in a tumour, with a non-cumulative or at any rate much less cumulative effect on the skin, and thus to bring about a selective action on the malignant tissue.

EXPERIMENTAL DETAILS

Transplantable tumours offer a unique material for the experimental study of the process of recovery from the damage inflicted upon malignant cells by sub-lethal doses of radiation. By transplanting tumours immediately after irradiation with such doses the effect of irradiation on the malignant cell is isolated from its effect in the tumour bed and from the subsequent reaction of repair.

Two series of experiments were carried out: one with a mixture of hard beta and gamma rays and a second one with gamma rays alone. The transplantable mouse tumour used was strain 2146, which has been used in previous investigations on the action of radium. It is a polymorphous carcinoma of the skin originally produced by tar painting, which is radiosensitive. It takes on transplantation in 100 per cent., grows very rapidly, and practically never undergoes spontaneous regression.

For purposes of irradiation the tumour is inoculated in small pieces of about 0·015 g. in such a way that it attaches itself to the skin and not to the muscles of the abdominal or thoracic walls, and that on the eighth day it has reached a size of about 5 by 7 mm. with a depth of about 4 mm. During the second week it rapidly increases in size, reaching at the end of the second week a weight of about 2 to 3 g. During the third week its size becomes so large that even if it has been transplanted deeply it begins to break through the skin and becomes largely necrotic with a weight of about 6 to 8 g.

Irradiation was performed always on the eighth day after transplantation with an applicator 23 mm. square, containing 58 mg. radium element. The lid of the applicator was of silver 0·12 mm. thick. In the first series of experiments a silver screen of 0·08 mm. thickness was interposed between the applicator and the skin, so that the total thickness of the silver screen was 0·18 mm.; in this case the radiation consisted of hard beta and gamma rays. In the second series a lead screen of 0·7 mm. thickness was interposed so that the radiation consisted entirely of gamma rays. In both series the distance of the applicator from the skin was 0·5 cm.

Under these standard conditions the shortest length of exposure necessary to produce a constant regression of the tumour, if left in vivo after irradiation, was for hard beta and gamma rays, 40 minutes; for gamma rays alone, 4–5 hours. The same biological effect—i.e., regression of the tumour—requires therefore with this applicator a length of exposure which is six times longer when gamma rays alone are used than when a mixture of hard beta and gamma rays is applied.

The dose necessary to produce constant regression of the tumour 2146 under standard conditions will be called "the tumour-lethal dose," and the fact may be recalled that if such a dose has been given and the tumour is transplanted immediately, the irradiated cells still produce new tumours although these tumours will temporarily grow more slowly and the percentage of successful takes is diminished to about 40–50 per cent. A tumour-lethal dose is therefore not sufficient to kill all the cells of the irradiated tumour: it is much smaller than the "cell-lethal" dose. In the first series of experiments with a mixture of hard beta and gamma rays the tumour was exposed to radium for a period of ten minutes and transplanted immediately. Such an exposure of ten minutes produces no measurable effect on the rate of growth of the tumour, if left in vivo, and only a very slight effect if it is transplanted immediately after irradiation; and in the latter case it does not diminish the number of successful inoculations. The dose is therefore so small as to be apparently ineffective by itself.

The tumours arising from the transplantation of the irradiated cells were charted in the ordinary way every seventh day, and the volumes of the tumour were calculated from the charted areas. On the seventh day after transplantation one of the transplanted tumours was exposed to a second dose of radiation for ten minutes and again transplanted immediately after irradiation. This procedure of irradiation, transplantation, and charting was repeated every seventh day. In this process the cells which were subjected to repeated irradiation were the descendants of the cells irradiated a week previously.

The results of this series of experiments are summarised in Fig. 1 in which the height of the columns represent the average volume of the tumours at the end of the second week after irradiation and transplantation. Fig. 1 shows that the first application of radium produces only a slight fall in the rate of growth, and this is not accompanied by a diminution in the number of successful takes. The next two applications of radium increase only slightly the inhibition of the growth rate which shows a decided fall only after the fourth application. At this point the number of successful takes also began to diminish. After the six applications the growth rate was slowed to such an extent that it was necessary to wait for two weeks before a tumour could be irradiated and transplanted. The growth rate is now distinctly higher, showing that the cells were beginning to recover from the effects of radium. Another series of weekly applications of radium again reduced the growth rate and the number of successful inoculations. Again an interval of ten days was allowed to elapse before the next application of radium. The same phenomenon of a partial recovery from radium was observed. The growth of the partially recovered cells was

again reduced by the repeated weekly application of radium. Altogether 13 exposures of ten minutes each were given in the course of the experiment.

In order to test for the recovery from radiation one tumour in the eleventh period of irradiation was transplanted 23 days after the last radiation. The result is represented by the last white column in Fig. 1

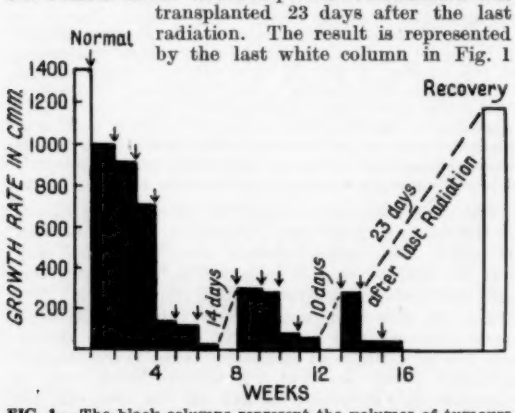

FIG. 1.—The black columns represent the volumes of tumours two weeks after transplantation, obtained from malignant cells irradiated serially with a mixture of beta and gamma rays for 10 minutes at intervals of one week. The first white column represents the normal growth rate of the non-irradiated cells, the last white column the recovery 23 days after the eleventh period of irradiation. The arrows indicate the application of radium. (For further explanation see text.)

showing that after that interval recovery was almost complete and that the tumour had resumed its normal growth rate.

The same experiment is represented in a different manner in Fig. 2. This figure gives the rates of growth during the first three weeks for the normal tumour, for the tumour after the second, fourth, and sixth irradiation, and for the final recovery. As the rates of growth of the normal tumour, of the tumour after recovery, and even of the tumour after the second irradiation, are so rapid, that their volumes at the end of the third week fall outside the ordinates, the graphs for these three cases are terminated by arrows. Figs. 1 and 2 demonstrate clearly that the fractionate application of small doses of radium, which by themselves produce a barely demonstrable effect, have a strikingly cumulative effect on the growth rate of the malignant cells, even when these doses are applied at intervals of time as long as seven days. The cancer cells have however the power to recover completely from this inhibition of growth and to return to their normal rate of growth when the application of radium is discontinued. When radium is applied at intervals longer than seven days the cumulative effect now fails to appear and there is a partial recovery in the rate of growth.

The results of the experiments with gamma rays are given in Fig. 3, which corresponds in its arrangement to Fig. 1. As stated above using the same applicator the time of exposure necessary to produce the same biological effect with gamma rays alone requires to be approximately six times as long as when a mixture of hard beta and gamma rays is used. The exposure with gamma rays alone would therefore have to be 60 minutes in order to produce the same biological effect as an exposure to ten minutes of beta plus gamma rays. In this experiment half that dose was used, by giving exposures for 30 minutes once a week. The general result of this experiment with the repeated application of such a small dose as 30 mg.-hours confirms that of the first series: there is again a cumulative effect, but with this smaller dose the cumulative effect is not only less rapid, as one would expect, but now and then the cells escape from it, indicating that the cells recover within seven days sufficiently from the effects of this smaller dose to make the next application non-cumulative. In both series the general course of events is the same. The first few applications of radium produce a very slight diminution in the growth rate and do not affect at all the number of successful inoculations. As the treatment proceeds the diminution in the growth rate becomes more marked and the viability of the tumour cells is diminished so that the number of successful inoculations diminishes. Some tumours fail to take from the beginning, others after a period of temporary progressive growth undergo spontaneous absorption. A third condition which has been observed is that the cells take on inoculation and form a new tumour which does not however increase perceptibly in size over a period of several weeks. I have described this condition of "dormant cancer cells" elsewhere.

ALLEGED EFFECTS OF SMALL DOSES IN INDUCING RADIORESISTANCE OR RADIOSTIMULATION

In the therapeutic application of radium to cancer in man irradiation of a tumour by doses inadequate to destroy it completely has been known to produce a condition of radioresistance in the tumour and this phenomenon has been ascribed to a change in the irradiated cancer cells themselves, or alternately to a selective destruction of the more radiosensitive cells, so that only the radioresistant cells survive. If this were the correct explanation these two series should have produced eventually a radioresistant strain. The results show, however, that the effects of radium became increasingly cumulative. The point was tested further by irradiating during the course of the second experiment, in addition to the tumour which was transplanted immediately afterwards, another tumour with the same dose and leaving it in vivo without transplanting it. As already stated, at the beginning of the experiment such a small dose failed to produce any noticeable

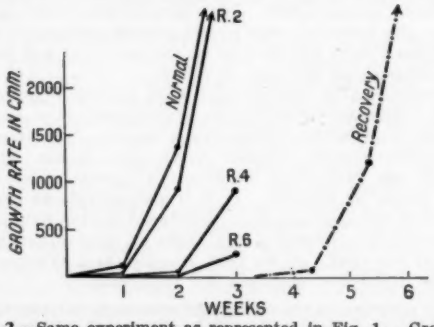

FIG. 2.—Same experiment as represented in Fig. 1. Growth rates for the first three weeks of the normal non-irradiated cells, of cells after the second (R2), fourth (R4), and sixth (R6) serial irradiation and the recovery of cells transplanted 23 days after the eleventh serial irradiation.

effect, even on the growth rate of a tumour left in vivo. During the later stages, however, such a dose either produced a definite slowing in the rate of growth, or even regression, of the tumour left in vivo. This is further evidence of the cumulative action of radium under these conditions, making the cells apparently more radiosensitive. These results therefore lend no support to the view that the clinically observed phenomenon of radioresistance developing

in a tumour irradiated with a dose insufficient to induce regression is due to a selective breeding-out of radioresistant tumour cells or to some change induced directly in the malignant cells. Since the phenomenon has been observed only in man when the irradiated tumour has been left in vivo, it is probably due to an imperfect process of regression

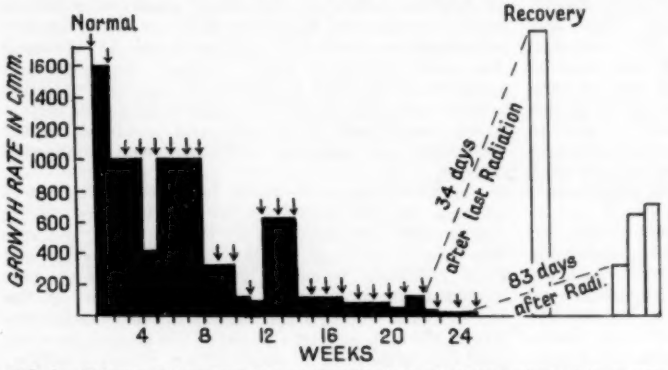

FIG. 3.—Volumes of tumours two weeks after transplantation obtained from cells irradiated serially with gamma rays alone for 30 minutes at intervals of one week arranged as in Fig. 1.

producing a mass of tumour cells enclosed by fibrous tissue which interferes with an adequate blood-supply so that the malignant cells are in a state of partial anaerobiosis, which, as has been shown (Crabtree and Cramer)[3] renders malignant cells less sensitive to radium. Another point of interest is that in the course of these two series no evidence was obtained of any stimulating action of small doses of radium on cancer cells.

The biological effects which have been described are accompanied by corresponding histological changes in the irradiated cells. These are the same as those observed after irradiation by a single massive dose—namely, enlargement of the cells with eccentric and often multiple nuclei. These changes are not conspicuous in the early stages of the experiment, but become increasingly evident with the repeated application of radium. One striking fact is that recovery was possible in all the stages of the experiment, where viable cancer cells remained, if irradiation was discontinued. The recovery was rapid in the earlier stages where the total dose administered has been small, but slow in the later ones.

GENERAL DISCUSSION

The experiments give therefore the result that the period of recovery in malignant cells from the damage inflicted by very small doses of irradiation is surprisingly long, much longer than had been suspected. Two different criteria were applied to judge the extent of the damage: the rate of growth and the stroma reaction in the new host as indicated either by the failure of the inoculated radiated tumour cells to take or the spontaneous regression of a tumour which had taken. Of these two criteria the stroma reaction is the more important, as it represents a more important factor of the therapeutic action of radium in the treatment of cancer than the mere arrest of growth.

Normal cells differ greatly in their radiosensitivity and therefore possibly also in the length of their recovery periods. The tissues and cells which are of special importance in the radiotherapy of cancer are the skin, the blood-vessels, and the connective tissue generally. The dosage which can be administered to a malignant growth is limited by the dosage which can be given to the skin without inflicting a severe damage. The reaction of the blood-vessels to irradiation is of importance, because the radiosensitivity of malignant cells depends upon an ample oxygen supply. A damage to the blood-vessels which results in an imperfect oxygen supply to the tumour will make the malignant cells radioresistant and must therefore be avoided. And since the regression of a tumour depends partly on the stroma reaction elicited by the damaged malignant cells, the reaction of the connective tissue to irradiation has to be taken into account.

The period of recovery for fibroblasts is, according to Spear [4] and his collaborators, very short. In observations on normal fibroblasts in tissue culture he found that after small doses (100 mg. radium for 2½ minutes) the cells recover completely within three hours, so that a second dose applied after such an interval does not produce a cumulative effect. Observations indicating a rapid recovery of the skin, which implies also a recovery of the blood-vessels of the skin, from small doses were first made by Regaud and Ferroux.[5] They have been confirmed by Mottram and Eidinow [6] for the skin of rats. They found that with a given applicator containing 60 mg. radium and using gamma rays an erythema was produced by a single dose of 12 hours (120 mg.-hours). With the same applicator giving exposures of five hours once a week 13 exposures were required to produce an erythema (3900 mg.-hours). Juul [7] obtained a similar result for the more delicate skin of mice.

RATIONALE OF A SELECTIVE METHOD OF RADIOTHERAPY

It follows, therefore, that the change induced by small doses of radium persists much longer in malignant cells than in the normal structures mentioned above—that is to say, the cells of the normal structures recover more rapidly than the malignant cells. This difference permits of the application of radium in such a way that a more truly selective effect on the malignant cells is obtained. The principle of such a method consists in the repeated application of very small doses and an extension of the time interval between each application just sufficiently long to prevent any cumulative effect on the normal structures without losing the cumulative effect on the malignant cells.

In order to test the validity of such a method under conditions resembling those which obtain in the radiotherapy of human cancer it was applied to mice with spontaneous mammary tumours, in which the spontaneous tumour had been removed by operation and autoplasts had been made in the right and left flank. One autoplast received a single dose with an exposure of 60 minutes, the other received repeated applications at intervals of 7 days of exposures lasting each time 10 minutes or 5 minutes respectively. The number of animals treated by this method is still small, and it must be remembered that a certain proportion of the spontaneous mammary mouse tumours are radioresistant. But in those animals in which the single large dose had an

effect the repeated administration of small doses was even more effective. In some cases this latter method proved to be more efficacious even with a smaller total dose. It is therefore justifiable to conclude that the method is theoretically sound and should be given a trial in the radiotherapy of cancer in man. It is, in fact, an extension of the technique of Coutard [8] who found that his clinical results improved as he diminished the daily dose and lengthened the time of treatment. The essential features of the method advocated on the basis of our experimental investigation are the use of very much smaller doses given at intervals much longer than is the practice now with intervals of one or two days. The method has the advantage that it produces a more selective effect on the tumour and thus avoids or delays the skin reactions which ordinarily limit the total dose of radiation which can be applied. The suitable doses and intervals of time for man have to be determined by clinical experience using as a guide the biological effects produced on the tumour and bearing in mind the importance of avoiding a damage to the skin and to the blood-vessels of the tissues surrounding the tumour. Since the time relations for biological processes are longer in man than in the short-lived mouse, these time intervals may be found to be longer than the weekly interval used in experiments in mice. The method has the further advantage that if it fails to bring about the complete disappearance of a tumour, it makes it possible to induce in the remaining cancer cells a "dormant condition" in which the malignant cells, while retaining their viability, fail to grow, and can be maintained in this condition by continued irradiation with small doses at long intervals, so that the disease, while not cured, is arrested.

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A METHOD OF SPACING RADIATION IN THE TREATMENT OF TUMOURS

BY J. C. MOTTRAM, M.B. Lond.

AND

J. MORTON, M.B. Edin.

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THIS method of treatment is based on two facts. The first is that cells under anaerobiosis are more resistant to radiation than cells well oxygenated. This accounts for many experimental findings; for instance, it has been shown that stoppage of the circulation in the tail of the rat, leaving the vessels either blanched or congested, markedly decreases skin reaction with regard to epilation, erythema, and ulceration [1]; it also explains why previous bleeding of an animal likewise reduces skin reactions and also renders tumours less sensitive to radiation.[2]

The second fact which is taken into account is that radiation, through action on capillaries and small blood-vessels, interferes with the circulation of the tissue or tumours radiated,[3 & 4] so much so that when an animal bearing two tumours, one radiated and one non-radiated, is inoculated with Indian ink a few days after the application of radiation, it is found that the ink enters the normal tumour but fails to gain entrance into the radiated tumour.[5] It follows that during the interference with the circulation following radiation, tumours must be radioresistant and that they will not again become radiosensitive until this damage to the blood-vessels has been recovered from. Thence the possibility occurred to us that a system of spacing irradiation which took account of these factors might, in certain cases, prove both practicable and justifiable in the treatment of patients suffering from malignant disease.

For this purpose it would be necessary to detect changes in the circulation of the tumours during treatment. In mice and rats the colour of tumours can be seen through the semi-transparent skin, and after radiation tumours are seen to become pale within a few days, with subsequent recovery to the normal pink colour if the radiation dose was not too large. In man, except occasionally in surface growths, this direct method of observation is not possible; it has been thought however that this information can be indirectly obtained. In rats and mice, interference with circulation, as seen through the skin, is associated with either slowing or cessation of growth of the tumours, or with their regression; this is not unexpected since growth is likely to be affected by a diminished blood-supply. Frequent measurements of the growth of tumours in patients will therefore indicate, by slowing or cessation of growth, times of vascular damage; and by recrudescence of growth, times of recovery from vascular damage; and so also times of radioresistance and of radiosensitivity.

Treatment is administered either continuously or at short intervals until the tumour shows an initial decrease in size; it is then discontinued until the measurements show an increase, when the process is repeated. The following two cases illustrate the method and bring out certain facts of especial interest.

FIRST CASE

Recurrent sarcoma of the left groin.—The mass in the groin was hard with sharply demarcated edges and with fixation to the overlying skin; caliper measurements gave approximately 2½ by 4 in. in minimum and maximum diameters; there was a palpable pelvic extension above and deep to the inner half of Poupart's ligament. Fig. 1 gives the measurements of the tumour, made after the first X ray treatment of 635 r, plotted against time; the arrows indicate times of X ray treatment.

After the first treatment of 635 r, the tumour continued to grow for eight days. On the ninth day 800 r was given; the tumour then regressed until the twentieth day, when increased measurements were obtained and when therefore a further treatment of 300 r was given. Subsequently the tumour regressed and grew alternately and whenever growth was observed small doses of radiation were administered.

Particular attention is drawn to the fact that, after the initial large doses of radiation, small doses sufficed to produce regression; for instance, on the thirtieth day only 100 r was given, and it was followed by marked regression. Further it is to be noted that the regressions following these small doses were immediate, within 24–48 hours. The cause of this sudden diminution in volume of the tumour is uncertain; it may be due to the quick destruction of a group of sensitive cells, or it may be due to a quick return of vascular interference from which

recovery has only very recently taken place. The variation in the colour of tumours in mice and rats after radiation, already referred to, supports the latter suggestion. At any rate, it would seem that once the tumour has been made to regress by large doses of radiation, afterwards small doses suffice to keep it on the down-grade, if administered at presumably radiosensitive periods.

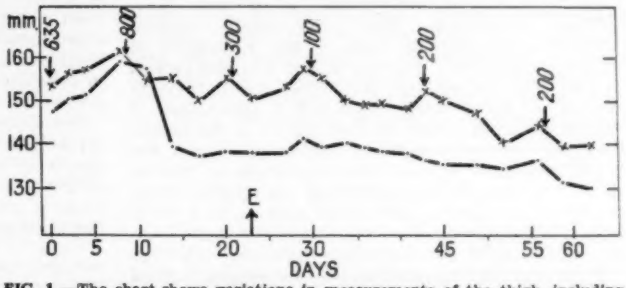


FIG. 1.—The chart shows variations in measurements of the thigh, including the tumour, taken from marked points on the skin, plotted against time; the arrows indicate X ray treatments, r units to the skin: upper readings = lateral diameter of thigh; lower = antero-posterior; E = erythema.

Sixty days after treatment was begun the following appearances were noted: the pelvic extension was much reduced in size and was barely palpable; the mass in the groin had shrunk to a diameter of 1½ by 2½ in. and was much flatter and softer; and the fixation to the overlying skin had disappeared. The patient's general condition was satisfactory, his weight having remained nearly constant. These satisfactory results were obtained, with only a slight erythema of the skin, on the twenty-third day. On the eightieth day the tumour had completely disappeared.

SECOND CASE

Squamous epithelioma of the penis.—The tumour consisted of a large fungoid mass, which completely surrounded the body and extended from the glans to the symphysis pubis, measuring approximately 7 by 6 cm.; considerable sepsis was present and operation had been refused. Fig. 2 gives the measurements made and the time of application of gamma radiation in r units to the depth of the tumour. In this case very small doses of radiation were not used; the radium was applied during periods of growth and withheld during periods of regression. Some regression followed the initial treatment; also it is to be noted that regression quickly followed the several treatments; there was no decided latent period, such as occurs when the skin shows erythema following exposure, and in many other biological reactions. The large total regression of the tumour was obtained without any damage to the surrounding normal tissues, except some epilation of the pubic hair. Now, 125 days after treatment began, apart from the big reduction in size, the edges of the ulceration are soft and relatively healthy, and give evidence of drawing together in an effort to reconstitute a normal penis; sepsis has almost cleared up and the patient's general condition has improved.

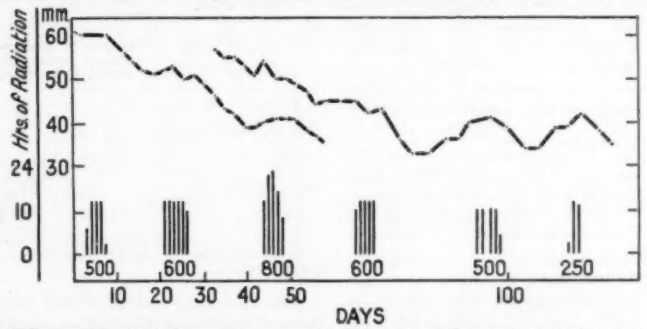


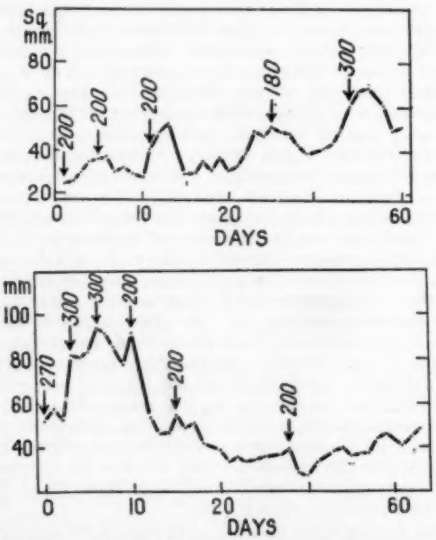
FIG. 2.—The chart shows measurements of the ulcerated growth plotted against time; vertical lines indicate hours of gamma radiation, and the number of r units for each batch of treatments is given. The upper readings are of the length of the growth, the lower of its breadth.

Both these cases were advanced and regarded as only suitable for palliative measures. A series of other patients are being treated along these lines and so far the results compare well with other methods of treatment; and at the same time the skin and normal tissues have shown either no changes or only trivial ones.

EXPERIMENTS

Side by side with the treatment of patients, a set of tar warts in mice has been treated with gamma radiation, spaced in the same manner; charts of two of these (Figs. 3 and 4) are given and likewise show regression following treatment within a day or two and without any latent period. More especially is this the case once the growth of the tumour has been controlled, when small doses of radiation suffice to produce much regression.

These warts vary much in colour according to the amount of blood passing through them, and their paleness after treatment suggests that their sudden marked diminution of size is probably due to an interference with blood-supply, rather than to the death and absorption of their tumour cells. In none of the warts treated was any injury to the surrounding skin observed, though many of the tar warts were cured and the skin had received from 5–7000 r in from 100 to 150 days.



FIGS. 3 and 4.—The charts show the major and minor diameters of the warts in sq. mm. plotted against time in days; arrows indicate exposure to gamma radiation; and the figures against the arrows give the dose in r units, to the depth of the wart.

DISCUSSION

These observations show that small repeated exposures to radiation lead to the regression of tumours without the intervention of a latent period. On the whole it appears that these diminutions in size are not due to destruction and disappearance of tumour cells, but rather to fluctuations in the blood-supply to the tumours, which form waves upon the slower regression due to disappearance of tumour cells. Secondly we have observed that, by applying treatment only during periods of growth, and withholding it during periods of regression, tar warts have been cured in mice, and tumours in man benefited, with no more than trivial damage to the surrounding normal tissues, such as transient erythema or partial epilation.

Both the tumour under treatment and the surrounding skin and normal tissues undoubtedly vary in radiosensitivity, such variations being brought about by the treatment itself. It follows that the ideal method of treatment will be to choose for each repeated treatment a time when the tumour is relatively radiosensitive and the skin radioresistant. Just as, in the treatment described, we have tried indirectly to measure the radiosensitivity of the tumour, so, to obtain the best results, some measure of the radiosensitivity of the skin and normal tissues is likewise required.

We are indebted to Mr. Stanford Cade and to Mr. Bernard Williams for permission to publish these two cases, and to Dr. G. Cranston Fairchild, the radiologist, who was responsible for the X ray treatment administered. The radium used for the tar warts was on loan from the Medical Research Council.

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INCREASING THE EFFECTIVENESS OF TESTOSTERONE

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THE effectiveness of testosterone in restoring the atrophic prostate and seminal vesicles of castrated rats can be much increased by adding *x*-substance [1] or pure fatty acids [2 3] to the solution injected, or even by augmenting the volume of oil used for injection.[3] This increased effectiveness is not obtained if the fatty acid or additional oil is injected separately, so that it is almost certainly due to alteration of the conditions of absorption of the hormone at the site of injection rather than to any synergism at the site of action.[2 3]

These results recall the great increase in the effectiveness of œstrone obtained by esterification or by subdivision of the total dose into a series of injections. We have now further examined testosterone, and certain other male hormone compounds, in the light of this analogy, and by the kind coöperation of Dr. K. Miescher and Messrs. Ciba Ltd., we have been able to investigate the behaviour of certain highly effective esters of testosterone.

Technique.—The rats were castrated in batches at 40-60 g. body-weight and used for experiment not less than one month later, when the rudimentary prostate and seminal vesicles have an average total weight of less than 25 mg. Five rats were used for each test, and comparison is made only between experiments carried out simultaneously on groups from the same batch. All compounds were injected in solution in arachis oil. Details of testing were as previously described.[3 4]

Subdivision of the daily dose.—It will be seen from Table I. that subdivision of the daily dose into morning and evening injections increases the effectiveness of the two free hormones used. The increase, however, is not so great as that obtained by increasing the volume of oil or by adding palmitic acid.

TABLE I

Comparative Effectiveness of Free and Esterified Hormones Given in Various Ways

How given.	Total weight of prostate and seminal vesicles (mg.).			
	Total dose of 5 mg.—		Total dose of 2 mg.—	
	Androstanedione.	Androstanediol acetate.	Testosterone, free.	Testosterone as acetate.
In 0·2 c.cm. oil once daily	65	158	82	411
In 0·1 c.cm. oil twice daily	100	164	245	490
In 0·5 c.cm. oil once daily	111	159	301	410
In 0·5 c.cm. oil + palmitic acid once daily	133	167	462	396

Injections for 10 days; rats killed on the day after the last injection.

The fact that palmitic acid increases the effectiveness of androstanedione,* an unesterifiable compound, shows that the action of the fatty acid is not dependent on actual chemical combination with the hormone. This observation is in keeping with the recent report that testosterone palmitate is inactive.[5] The increase of effectiveness obtained by dividing the daily dose points clearly to retardation of absorption as the mode of action of the additional oil or fatty acid.

Testosterone acetate and testosterone propionate.—Testosterone benzoate, the first ester to be made, is only slightly active on capons.[4] Miescher, Wettstein, and Tschopp,[5] however, have recently given a preliminary account of the biological properties of a whole series of esters of testosterone with aliphatic acids, of which several, notably the acetate and propionate, are highly active. A detailed paper by these authors is to appear in the *Biochemical Journal*.

Our first experiment was to ascertain whether the various methods by which the effectiveness of the free hormone can be altered are applicable to the esterified hormone. From Table I. it will be seen that subdivision of the daily dose, increase of oil, or addition of palmitic acid all fail to alter appreciably the response evoked by the two acetates used. Testosterone acetate, given alone in a small volume of oil, is as effective as the free hormone given with palmitic acid and excess oil. As shown in Table II., the propionate is even more effective.

It seems therefore that, given as acetate or propionate, the hormone becomes slowly but continuously available to the animal so that the loss by excretion and destruction is very much less than when free hormone alone is administered.

This finding that palmitic acid makes no difference when the availability of the hormone to the animal

* A saturated diketone corresponding to the hydroxyketone androsterone.

is already regulated by the slow breakdown of an ester is further evidence that the acid acts by delaying absorption. It may be emphasised that any "accessory substance" having a genuine synergism with the hormone at the site of action should be as effective when given with the ester as when given with the free hormone. In view of the uncertainty as to the mode of action of the *x*-substance, experiments by the Amsterdam school on the addition of *x*-substance to esterified testosterone will be awaited with interest.

Duration of effect of a single injection.—The effect of androsterone benzoate may be exerted long after the last injection.[6] We have therefore examined the duration of effect of certain esters in groups of rats killed at various times after the injection of a single dose. A similar technique has been used by the Basle workers. Single injections of 5 mg. androstanediol acetate or androstanediol benzoate † produced only a negligible response at 5, 10, or 15 days afterwards. The meaning of this is not yet clear. A single injection of 2 mg. of testosterone as acetate ‡ given in 1 c.cm. oil produces good growth of the

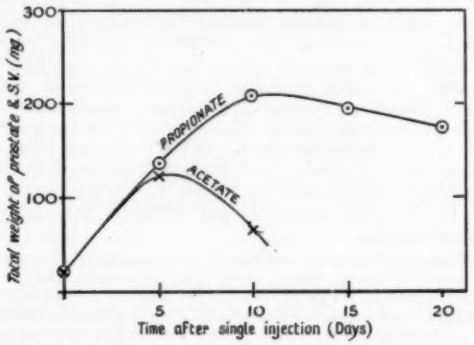

FIG. 1.—Duration of response to a single injection of 2 mg. testosterone, × as acetate, ⊙ as propionate.

prostate and seminal vesicles 5 days later but the growth is not maintained and the organs are regressing at 10 days after injection. Following a single injection of 2 mg. testosterone as propionate, however, the prostate and seminal vesicles continue to grow strongly for 10 days or more, by which time they reach a size similar to that produced by the same dose of free testosterone split up into twenty 12-hourly injections (Fig. 1). The response to a single injection of testosterone is negligible.

Frequency of injection necessary to maintain effectiveness.—In view of the above results it was decided to examine the two esters from the point of view of the minimum frequency of injection necessary to maintain maximum effectiveness. The results are shown in Table II. and Fig. 2. From these it may be concluded :—

(*a*) That even when given in a large volume of oil the free hormone requires to be injected at least once daily to show moderate effectiveness.

(*b*) That provided the total dose is constant, injections of both the propionate and acetate can be restricted to twice a week without loss of effectiveness and probably even to once a week without serious wastage.

(*c*) That of the two esters, the activity of the propionate is both more intense and more prolonged.

† Androstanediol 3-acetate and 3-benzoate.

‡ All doses of testosterone esters are based on equivalents of free hormone. Thus 1·2 mg. propionate ≡ 1·15 mg. acetate ≡ 1·0 mg. free hormone.

The average total weight of seminal vesicles and prostate in untreated castrated rats is less than 25 mg.; it will thus be seen that the growth produced by the propionate in 10 days is really astonishing, the glands being nearly as large as those of normal adult males of similar body-weight. One rat, given three doses of propionate over 10 days,

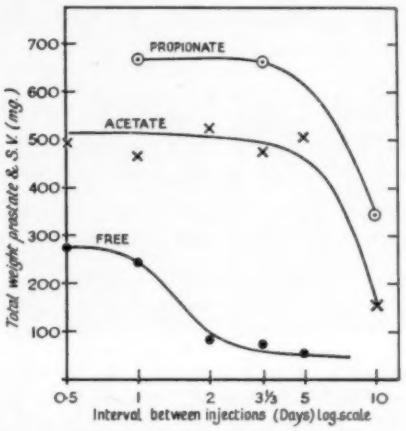

FIG. 2.—Effectiveness of total dose of 2 mg. free testosterone, 2 mg. testosterone as acetate, and 2 mg. testosterone as propionate in relation to frequency of injection over a 10-day period.

had seminal vesicles alone of 690 mg. The suggestion that the accessory glands of castrated rats cannot be made to approach normal size in so short a time as 10 days is thus refuted.

These results indicate that the propionate of testosterone is much the most active male hormone compound so far known. It is, in fact, a most remarkable substance, which should be invaluable for clinical purposes where daily administration is inconvenient or even impossible.

TABLE II

Comparative Effectiveness of Testosterone, Testosterone Acetate, and Testosterone Propionate in Relation to Frequency of Injection

Total dose given as—	Total weight of prostate and seminal vesicles (mg.). Testosterone—		
	Free.	Acetate.	Propionate.
20 injections at ½-day intervals	272	491	—
10 injections at 1-day intervals	246	467	665
5 injections at 2-day intervals	82	522	—
3 injections at 3½-day intervals	74	477	660
2 injections at a 5-day interval	54	505	—
1 injection at the beginning of the 10-day period	—	153	343

Total dose in each case equivalent to 2 mg. testosterone. Duration of experiment, 10 days; total oil, 5 c.cm.

SUMMARY

Testosterone acetate and testosterone propionate are many times more effective than the free hormone, and their action is so prolonged that injection can be restricted to twice a week without loss of effectiveness.

Of the two compounds, the propionate has a more intense and more prolonged action than the acetate.

We are again greatly indebted to Dr. K. Miescher and his colleagues, of Messrs. Ciba Ltd., for supplies of the compounds and for early information about their results.

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VASCULAR TUMOUR SEATED IN EXTENSOR HALLUCIS BREVIS MUSCLE

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Campbell de Morgan, writing in 1864 on "Vascular Tumours Seated in Muscle," expressed the opinion that these growths must be extremely rare, since "it is very little likely that they should have been often found, but neither described nor preserved." He alluded to some 12 cases, which were all that he could find to have been recorded up to that time.

CLASSIFICATION

From a survey of these together with a study of several cases of his own, de Morgan classified vascular tumours arising in muscle as follows.

1. Tumours having the appearance of a varicose state of the veins, unconnected with the muscular tissue in which they lie, but yet not isolated by any well-defined covering of connective tissue.

2. Erectile tissue, forming in and encroaching on the muscular tissue, from which it is not separated by any defined boundary.

3. Erectile tissue, forming a defined tumour, having an investment of connective tissue, not continuous with the muscular tissue in which it is embedded.

The term "erectile tissue" appears to have been started on its career by Liston, who published the first description of this condition in 1843.[1] Since then it has disputed the honours with a diversity of other terms such as telangiectasis, cavernous angioma, hæmangioma, &c., which reflect the variety of the histological appearances of these tumours. De Morgan preferred the terms erectile tumour or blood or vascular tumour to—

the more lofty sounding one of "telangiectasis" inasmuch as they are far more easy to read and write, and as they convey quite as correct a notion of the character of the disease. The term "erectile" simply points to a fact that these tumours under certain circumstances become turgid, and again empty themselves. It does not imply that they possess the peculiar nervous endowments and vascular arrangements of the normal erectile *tissue*.

He considered that these were morbid growths, most often of congenital origin, though sometimes, as far as could be ascertained, they came in later life after an injury.

PATHOLOGY

Histologically the tumours in de Morgan's cases showed a cavernous structure.

This consisted of blood-containing cavities of various sizes embedded in a connective tissue stroma containing fatty tissue and a quantity of muscular tissue, particularly near the outer surface of the tumour. These muscular fibres were scattered and separated by adipose tissue, and from the indistinctness of their markings and their granular opacity were judged to be undergoing a process of atrophy. In the thicker portions between the neighbouring sinuses, yellow elastic tissue occurred plentifully. Mention is also made of the fact that some of the cavities "receive buds from the fibrous partitions or meshwork: these have rounded ends, and appear to be outgrowths."

With regard to the origin of these tumours, de Morgan confesses that "the early condition of vascular tumours has not yet been satisfactorily investigated, and very little has hitherto been done towards determining their mode of growth, or their true structure." And again in the same connexion—

Nothing is known of the causes which determine the seat of the disease in one or other of the vascular tissues. Sometimes, it is said, the arterial portion of the vascular tissue is principally affected, sometimes, and perhaps more usually in tumours, the venous, while probably in all cases, there is as well some affection of the capillaries.

This problem was especially investigated by H. Sutter,[2] working in the surgical clinic of de Quervain. His researches, published in 1905, were based upon a review of all the previously published cases, together with a study of 5 cases personally investigated. The fact that the total of published cases since Liston's original description then numbered but 40 bears witness to the rarity of the condition. From a histological study of his material, Sutter advanced the theory that the primary event in the genesis of these vascular tumours is a proliferation of the smooth muscle in the walls of the smaller blood-vessels.

This proliferation, which is accompanied by some increase of elastic tissue, is at first concentric, but later proceeds to a stage at which the smooth muscle-fibres derived from adjoining arterioles intermingle, resulting in a meshwork whose origin from the vessel walls is no longer obvious. At this stage the histological picture is not unlike that of small fibromyomata of the uterus, and Sutter refers to the possibility that these tumours may likewise arise primarily in a proliferation from the vessel walls. He believes that the thin-walled cavernous blood spaces, lined by a single layer of endothelium which occur to a greater or lesser extent in all these tumours, are due to a dilatation of the capillaries of the perimysium imprisoned within the meshwork of the proliferated smooth muscle. This dilatation of the capillaries would follow a stasis of the blood stream due to a partial strangulation of the thin-walled vessels by the newly formed muscle-fibres. In serial sections Sutter was able to trace the thin-walled cavernous spaces back to the capillaries of the perimysium, whereas the arterioles in the growth, when followed to their terminal branches, lost themselves among the meshwork of connective tissue and plain muscle forming the groundwork of the tumour, without establishing any observable communication with the cavernous spaces. It was otherwise with the veins, which were occasionally found to open into the spaces.

Sutter also mentions the presence, here and there, of clusters of proliferating capillaries which have the appearance of multiplying by a process of budding.

De Morgan stated that vascular tumours seated in muscle occurred most frequently in the lower extremity, thus contrasting with cutaneous and subcutaneous nævi. Judging, however, from Sutter's list of published cases, they appear to occur in any of the skeletal muscles without showing preference for any particular regions of the body. The case here reported seems to be the first on record to occur in the extensor brevis hallucis, or indeed in any of the small muscles of the foot.

CASE REPORT

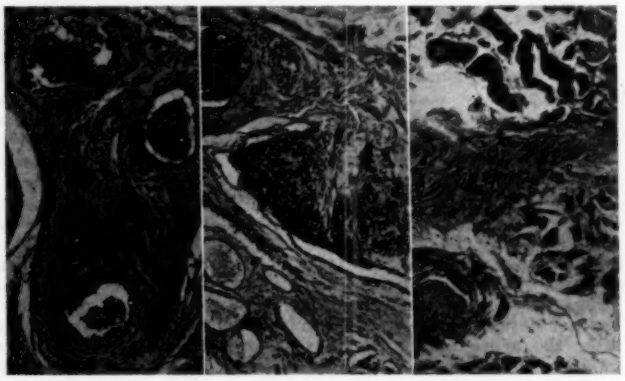
The patient, a female aged 20, was admitted to the General Hospital, Birmingham, under Mr. J. B. Leather, presenting a swelling on the dorsum of the left foot. This was first noticed 13 months previously. She thought that it might have followed an injury sustained while skating, but she could not recall any definite trauma. Aching pain had been experienced from time to time, but the foot was not painful at the time of admission.

Examination.—A flat, dome-shaped swelling was present on the dorsum of the left foot, roughly circular in outline (Fig. 1). The margins were fairly well defined, and the consistency was soft and compressible. The skin over the swelling was normal in every respect. Expansive pulsation, synchronous with the arterial pulse, was conspicuous throughout the swelling. The dorsalis pedis artery, approximately normal in size, was felt running into the tumour at its proximal border, and a similar sized vessel was palpable at its distal edge. Compression of the dorsalis pedis artery abolished the pulsation in the swelling. The general examination of the patient revealed no other abnormality. A radiogram of the foot was normal.

Operation.—The tumour was explored by Mr. J. B. Leather under a general anæsthetic. It was found to consist of a whitish mass with a plexiform formation. At its circumference it received numerous small arterial branches from surrounding tissues, and at its upper border the main trunk of the dorsalis pedis artery, somewhat dilated, appeared to enter it. The arterial tributaries were divided between ligatures. The tumour was then seen to be seated in the belly of the extensor hallucis brevis muscle. The muscle was therefore completely excised.

Microscopical Report.—Sections of the tumour consist mainly of well-defined blood-vessels which vary in appearance from thick-walled arteries to sinuses lined by a single layer of endothelium (Fig. 2 A). In addition, groups of hyperchromatic oval cells partially differentiated into capillaries are present (Fig. 2 B). The vascular elements are surrounded by areolar tissue through which run fine strands of smooth muscle fibres, continuous with those of the vessel walls. In specially stained sections elastic fibres are seen, both in the walls of the larger vessels and in the connective tissue stroma. No capsule intervenes between the tumour and the striped muscle which surrounds it. At the periphery of the tumour striped muscle-fibres are seen included within the growth, and some of these show signs of degeneration. Here and there, the degenerated striped muscle-fibres have evidently been replaced by fatty tissue (Fig. 2 C).

FIG. 1.—Showing extent of the pulsatile swelling.



A B C

FIG. 2.—Photomicrographs of the tumour (× 55). Left: well-formed arterioles with intermingling of smooth muscle-fibres from the walls of adjacent vessels. Centre: masses of hyperchromatic cells partially differentiated into capillaries, and thin-walled sinuses. Right: invasion of striped muscle at the edge of the tumour; some of the striped muscle-fibres show degeneration, and there is no capsule.

CONCLUSIONS

The tumour in this case appears to belong to the second group of Campbell de Morgan's classification of vascular tumours seated in muscle—i.e., it is a tumour of "erectile" tissue, forming in and encroaching on the muscular tissue, from which it is not separated by any well-defined boundary. Its histological characters conform closely, for the most part, with the description given by Sutter of his cases, though there is only a suggestion of that proliferation of smooth muscle to which he attributes a major rôle in the histogenesis of these tumours.

I am much indebted to Mr. J. B. Leather for permission to publish this case.

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THE MENTAL SEQUELÆ OF CHRONIC EPIDEMIC ENCEPHALITIS AND THEIR PROGNOSIS

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Accounts of the late results of encephalitis lethargica appear to be few; A. J. Hall's [1] being the only accounts in this country. Renaud, Miget, and Brizard [2] advanced the theory that the disease reaches a fastigium and declines. The present paper discusses this view, but deals particularly with the mental features.

The material is 174 patients admitted to West Park Mental Hospital since 1924, the majority of

[1] The Lancet, 1935, ii., 147, and Practitioner, 1934, cxxxiii., 26.
[2] Renaud, M., Miget, A., and Brizard: Bull. et mém. Soc. méd. hôp. de Paris, December, 1932.

whom had their acute attack in 1922–24. Very few of the cases were acute on admission, the period since the acute attack varying from 2 to 7 years in the majority. No relationship can be traced between the type of acute attack and the later developments.

PHYSICAL SYMPTOMS

It is necessary first to discuss the physical aspects of the disease, since that determines the outcome in most cases.

Parkinsonism may develop as part of the acute attack, or its onset may be delayed as long as 8 years before symptoms are apparent to the patient. Progress after appearance is equally variable; some patients progress steadily and die within a year (2 cases) or more slowly, up to 5 years. These latter cases early develop serious symptoms and the type is commoner in the older patients. In other cases the disease may appear stationary, to develop further after intervals of as much as 8 years, while one patient has not developed any fresh symptoms for 14 years after the acute attack. It is therefore impossible to state for at least 8 years that any patient is stationary or will not develop symptoms and in the majority there is no evidence of a termination of the disease.

Other physical symptoms which have appeared bear this out. Two patients developed spasmodic torticollis 6 years and 11 years respectively after the acute attack, while strabismus has developed at 2 and 11 years, and nystagmus been first observed at 10 years.

Oculogyric crises may be considered here, though the mental associations are also important (37 cases). The onset is separate from parkinsonism, and the crises may be the only feature, at any rate when first appearing. It commonly occurs 2 to 4 years after the attack, but the limits are 0 to 9 years in the series. Improvement has been found in 11 cases, no further attacks being noted in from 2 to 8 years. Of the patients 5 are dead, 2 lost sight of; the rest still have attacks, but some less frequently. Stramonium suppresses some attacks, others react to bromide and luminal in addition.

CAUSES OF DEATH

In the 43 patients (25 per cent.) who died, the causes were as follows:—

Directly following acute attack	3
Relapse	3
Sudden death due to encephalitis (Hall's type)	4
Chronic decline with intercurrent disease	25
Bronchopneumonia, 11; empyema, 1; pyopneumothorax, 1; tuberculosis, 4; colitis and dysentery, 2; perforated gastric ulcer, 2; appendicitis, 1; volvulus, 1; chronic valvular heart disease, 2.	
Suicide	3
Heat stroke	1
Collapse from exhaustion (apache)	1
Accident on leave	1
Malaria (therapeutic)	2

Encephalitis thus caused death directly in 13 cases and was an important factor in the others, even the accident being precipitated by clumsiness in crossing the street.

Sudden death (4) occurred with symptoms of asphyxia in young patients with mild or moderate parkinsonism. Similar attacks have occurred in 2 cases with recovery.

Heat stroke was apparently due to failure to move out of the sun, combined with stramonium medication. Hall mentions hyperpyrexia, but it has not occurred in this series without these factors.

Suicides are few; this will be discussed later.

EXPECTATION OF LIFE

Cases surviving over 8 years seem to have a much improved expectation of life; 28 cases are living over 13 years after the attack and none have died after 12 years.

MENTAL SYMPTOMS

Subacute confusional reaction.—Confusion with terrifying hallucinations developed in 5 cases. One has recovered, and apparently remains well; 2 have lost their symptoms but have become typical apache cases; 2 have developed paranoid schizophrenic types of psychosis.

Subacute behaviour disorders of the restless confused type occurring shortly after the acute phase tend to recover inside 2 years, usually with a residual bradyphrenic state.

Amnesia for subacute attacks is the rule, contrasting with the usual good memory for the illness.

Chronic types: bradyphrenia.—The onset is usually parallel with parkinsonism, but may precede physical symptoms (4 cases); difficulty in thinking or making an effort are then complained of. Progress is intermittent as in parkinsonism, and cases may remain stationary for several years with subsequent increase. The general course is to increased apathy and inertia with progressive restriction of interests until the patient only responds to a strong stimuli. There is not necessarily dementia; a similar state in untreated cases can be considerably improved by drugs, and become active mentally, though activity is usually not of high level. The later the onset the slower is the progress, and the greater likelihood there is of long stable periods. Recovery probably never occurs, apart from the relief given by the belladonna group of drugs, which may effect considerable improvement and enable a helpless patient to occupy himself and take part in social activities.

Apache types.—Apart from the confusional type of behaviour disorder, the onset of asocial conduct varies from 1 to 8 years after the acute attack. The behaviour disorder tends to improve (under institutional conditions), the duration of the illness being 2 to 8 years from the onset in young cases. Some appear to require institutional conditions to maintain their stability, but all the cases over 8 years ill with this type of disorder are now discharged or on parole (with two exceptions), if their physical state and absence of bradyphrenia permits.

Other behaviour disorders.—A group associated with oculogyric crises has a prognosis depending upon the ocular symptoms; the behaviour improves with improvement in the crises. None of these cases has so far lasted 8 years. "Screamers" appear similar in type, but none improved and all are dead of intercurrent disease or suddenly. Obsessional thoughts or actions associated with oculogyric crises vary with the ocular symptoms. Any of these cases may be left with residual bradyphrenia.

PSYCHOTIC DISORDERS

Depression was a notable feature in 98 cases; of these 60 were judged to be of *reactive type*, the depression being precipitated by the physical or mental disability, and its social consequences. (40 bradyphrenia and parkinsonism, 14 oculogyric crises, 2 polydipsia, 4 compulsive thoughts or actions). Before admission 17 of these cases had attempted suicide. Depression has improved in all but 6 of the parkinson bradyphrenic group; 6 are discharged, 9 dead (2 suicides), 1 is improved but transferred, and 12 of the remainder are on parole; the remainder are unfit physically. Of the oculogyric cases 1 has

been discharged, 7 are not depressed, while the remainder show depression with their ocular attacks. The 2 polydipsia cases have improved, with the disappearance of the polydipsia, and 1 obsessional case has been discharged.

Other types of depression.—One case was manic depressive in type before encephalitis; he recovered. One was a typical senile case, appearing after an acute attack of encephalitis. There were 5 confusional cases, 12 apache, 1 epileptic, and the remainder schizophrenic.

Schizophrenic reaction types.—There is no definite association with parkinsonism. In 2 cases the diagnosis rests on the history, and very slight physical signs (one case is omitted as it is judged that the original diagnosis of encephalitis was a previous schizophrenic stupor). Schizophrenic types of reaction have been shown by 36 patients, while 8 belong to the paranoid paraphrenic group. The onset of mental symptoms have been from 2 to 10 years after encephalitis. In 5 cases definite evidence of family or personal psychotic trend has been found. Recovery has not occurred in any case, but the schizophrenic symptoms have faded with increasing bradyphrenia in many cases. It would appear that the prognosis here follows the usual lines, and the physical damage due to encephalitis heavily weighs against recovery.

Epilepsy.—Ten patients have developed seizures; the cases seem to differ in no way from those of other ætiology.

Suicide.—Forty-five patients attempted suicide before admission, 21 others threatened to do so; 13 patients have attempted suicide while in hospital, and 1 while on leave. The number of successful suicides is 3. As mentioned under depression, many other patients were depressed, but definite acts or statements of suicidal intent were lacking. At the present time only 2 patients are under special observation as suicidal; 11 are dead, 3 transferred to other institutions, 9 are on parole, and 14 discharged. The remainder are physically feeble, but not regarded as dangerously suicidal.

The classification of types has been dealt with under *depression*. It is worth noting that most threats and some attempts at suicide are done to gain notice or sympathy; they are not done where success is likely. In a hospital such attempts gain nothing for the patient, and so are less common. Regular administration of drugs is another important factor in reducing suicidal tendencies; relapses into depression occur when drugs are withdrawn, and four patients made suicidal attempts when drugs were omitted on leave or trial. The successful suicides have all been mild cases of parkinsonism, one a puerperal confusion, one schizophrenic, and the latest a mild bradyphrenic who had been on parole for years.

It would therefore appear that the danger of suicide is greatest in the early and mild stages of the disease; also where drugs do not cause improvement, or are not taken regularly; and slight in hospital where the patient is sheltered from stresses, and on more equal terms with his fellows. This concurs with the experience of clinics where these patients are treated as out-patients, where suicides have been more common than in the present series.

TREATMENT

The patients in this series have been treated with the belladonna group of drugs, and since 1930 with stramonium (old B.P. tincture) in doses up to ♏120 t.d.s. or ♏90 q.d.s. Bromide grs. 10 t.d.s. and Luminal gr. ½–1 b.d. in addition have been helpful in some oculogyric cases.

SUMMARY

Recovery is not to be expected, but symptoms may be relieved by drugs, and remain stationary for long periods. The probability is that all cases progress. No limit can at present be assigned beyond which symptoms will not appear.

Behaviour and depressive disorders tend to improve; schizophrenic cases have a worse prognosis than usual.

The progress of all cases is largely determined by the progress of parkinsonism and bradyphrenia.

Thanks are due for permission to use the case material to Dr. Norcliffe Roberts, medical superintendent of the West Park Mental Hospital, and to Dr. J. S. Harris for his assistance and advice on cases and general principles.

TROPICAL MACROCYTIC ANÆMIA

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THE expression tropical macrocytic (or megalocytic) anæmia has found its way into the text-books without any very exact definition of either the clinical syndrome or the hæmatological picture that it represents. The credit, and the responsibility, for introducing the term is traceable to Dr. Lucy Wills [1] who originally described the condition in pregnant women in India and who has referred to a similar condition that is encountered in women who are not pregnant—to this type she attaches the adjective "idiopathic"—and in men. From a hæmatological point of view she distinguishes this disease from pernicious anæmia by the following characteristics:—

(1) The presence of free acid in the gastric secretion; (2) a negative indirect van den Bergh test; (3) the absence of any increase of urobilin in the urine; (4) less irregularity in the size, shape, and colour of the red cells; (5) an increase in the white cell count; (6) an inversion of the polymorphonuclear-lymphocyte ratio; and (7) an absence of any right-handed shift in the Arneth count.

Clinically, she distinguishes the condition from pernicious anæmia by the absence both of neurological symptoms and of the natural remissions (except at the termination of pregnancy) that occur in that disease.

She considers that the condition is a deficiency disease, the deficiency not being inherent as in pernicious anæmia, but one in the diet of the patient, which, when it occurs in pregnancy, is exaggerated by the increased demands on the patient. She has produced epidemiological, clinical, and experimental support for this, as she has shown that the disease is very common amongst pregnant women on a low vitamin-B diet, and that it is curable by the administration of Marmite, a substance rich in vitamin-B complex; she has produced a similar blood picture in monkeys by keeping them on a low-vitamin diet and has also cured the condition by giving them marmite, after failure to cure it with vitamins A and C. She has further suggested, and has received much support for this suggestion from other workers, that the deficiency factor in the food, which is supplied by marmite, is identical with Castle's extrinsic factor. Her more recent work [2] on the identification of the specific fraction in marmite is not relevant to the discussion in this paper.

TABLE I.—*Hæmatological and Gastric Examination*

Case.	Sex.	Age.	Diet.	Hb. (g. per 100 c.cm.).	R.B.C. (millions).	Reticulocytes (% R.B.C.).	Cell volume (%).	M.C.V. Normal = 89 (cu. μ).	M.C.H. Normal = 29 (γγ).	M.C.H. concn. (%). Normal = 34.	W.B.C. (thousands).	Eosinophils (%).	Polychromasia.	Anisocytosis.	Megaloblasts.	Normoblasts.	Gastric acidity.	Maximum free acid (c.cm. N/10 NaOH).	Excess urobilin in urine.	Indirect van den Bergh.	Spleen (ins. below costal margin).
1	F.	43	M.g.	7·3	2·41	2·3	..	..	30·3	..	8·75	..	+	+	−	−	Hypo.	10	?	+	..
2	F.	32	M.	4·8	1·30	1·0	..	..	37·0	..	6·40	..	−	−	−	−	Hyper.	70	+ +	+	..
3	F.	30	M.p.	5·5	1·77	1·0	24·0	135·6	31·1	22·9	5·00	4	+	+	−	−	..	..	+ +	+	..
4	F.	28	V.e.	8·4	2·52	3·8	27·2	107·9	33·3	30·8	6·35	3	−	−	−	−	N +	42	+	−	..
5	M.	22	Veg.	5·8	1·77	4·5	18·5	104·7	32·6	31·0	3·70	0	−	−	+ +	+	N −	21	±	+	..
6	M.	30	Veg.	8·8	2·43	0·2	26·0	107·0	36·2	33·8	9·50	18	−	−	−	+	Hypo.	15	+ +	+	..
7	M.	22	Veg.	6·6	1·43	7·8	20·7	143·0	46·2	31·9	3·95	2	−	−	−	−	Hypo.	4	+	+ +	4
8	M.	21	M.	2·2	0·76	9·0	7·6	100·4	29·0	28·8	4·00	4	+	+	−	−	..	..	±	−	6
9	M.	27	F.	3·4	1·04	5·0	..	..	33·0	..	2·80	1	−	−	+	+	Hyper.	60	+ +	+	7
10	M.	20	M.	7·1	2·53	9·3	22·5	88·9	28·4	31·8	5·00	2·5	−	−	+	+	N +	?	+	+	7
11	M.	25	M.p.	7·7	2·54	4·4	25·0	98·4	30·3	30·8	3·13	3·5	−	−	+	+	N +	34	+	+	7

M.C.V. = Mean corpuscular volume : M.C.H. = Mean corpuscular hæmoglobin ; M.C.H. concn. = Mean corpuscular hæmoglobin concentration.

Diet.—Veg. = strict vegetarian ; V.e. = vegetarian but eats eggs ; F. = vegetarian, with eggs and fish ; M. = mixed diet ; g. = good, p. = poor.

Gastric acidity.—N + and N − = within normal range, on the high side and on the low side respectively.

CLINICAL OBSERVATIONS

In the hospital attached to the Calcutta School of Tropical Medicine we have had a number of anæmic patients during the last year. A study of the blood picture of these has been made as circumstances permitted. They can be classified as follows :—

(*a*) Hæmolytic anæmia, usually following malaria : a normocytic anæmia, with a moderate reticulocytosis, a positive indirect van den Bergh reaction, and much urobilin in the urine ; after the specific infection has been cured, these respond well to treatment of any kind, but the improvement is accelerated by iron in large doses.

(*b*) A microcytic anæmia, associated with bleeding—e.g., from piles—heavy hookworm infection, achlorhydria or hypochlorhydria, or "idiopathic" responding very well to iron in large doses.

(*c*) A group of cases of macrocytic and hyperchromic anæmia that will be discussed in further detail below.

(*d*) A miscellaneous group that did not respond well to any form of treatment ; this group includes some patients who died before complete investigations were made.

We classed 3 of the macrocytic cases as of the pernicious anæmia type ; there was complete achlorhydria, even after histamine, and following the administration of liver extract there was a reticulocyte rise, a steady improvement in the blood picture, and a return to normal in the size of the individual cells ; there were, however, no neurological symptoms. There were 2 cases of a sprue-like condition. The remaining cases can be classed as tropical macrocytic anæmia ; of these 2 left the hospital before treatment had had time to take effect, and 2 others, though apparently of this class, did not respond to either marmite or liver extract and left hospital only very slightly improved. Some details of the other 11 cases are given below ; there are many gaps in the hæmatological data, as the calls upon the time of the staff were considerable, and for this reason examinations were not as complete or repeated as often as I should have liked. In 3 cases the cell volume was not estimated as halometric readings were taken instead, and I do not now consider these worth recording.[3] It will be noticed that in 1 case the cells can scarcely be called either macrocytic or hyperchromic, and in another 2 the colour-index was practically normal ; these have been included not only because they improved with marmite but because the volume and colour indices were reduced considerably during the treatment and because we have found [4] that in certain coolie classes (from which these patients came) both the colour and the volume-index is well below normal when these people are apparently in good health.

Of the patients 9 were Indians, 1 was a European, and 1 an Anglo-Indian. There were 4 women, including the 2 non-Indians, but none of them was pregnant. One had passed through a normal pregnancy four months before and had been anæmic since. One woman was aged 43 and another 32 ; the rest of the patients, including all the male patients, were aged 20–30. Their social status and dietetic habits are discussed below. In 4 of the men there was a very considerable degree of splenic enlargement—below the level of the navel—1 had a spleen about 4 in. below the costal margin, and in 2 the spleen could not be felt. None of the women had an enlarged spleen. A history of irregular fever was given by 3 of the patients with an enlarged spleen, but in no case was fever a prominent symptom at the time of admission.

TABLE II.—*Response to Treatment*

Case.	R.B.C. initial count (millions).	Reticulocytes.				R.B.C. increase (millions).	Final corpuscular Hb.	Final corpuscular volume.	Days under observation.	Days of marmite.
		Initial count (% R.B.C.).	Maximum response.	Day of maximum response.	Final count (% R.B.C.).					
1	2·41	2·3	4·3	6th	1·0	1·83	29·3	..	23	19
2	1·30	1·0	7·4	7th	1·4	2·31	30·4	..	35	34
3	1·77	1·0	10·0	6th	3·0	2·37	26·8	85·4	20	19
4	2·52	3·8	..	..	0·8	1·38	27·8	91·0	23	22
5	1·77	4·5	6·8	5th	2·0	2·03	30·9	88·9	17	16
6	2·43	0·2	10·0	6th	1·7	1·70	31·3	100·0	17	16
7	1·43	7·8	9·6	9th	6·2	3·16	29·6	86·3	64	56
8	0·76	9·0	13·6	7th	2·6	3·64	23·6	86·7	38	37
9	1·04	5·0	41·0	7th	6·2	3·31	25·3	..	43	42
10	2·53	9·3	..	..	0·2	1·95	25·7	77·8	92	67
11	2·54	4·4	6·5	6th	1·6	2·34	25·9	81·25	62	44

Symptoms that brought the patients to hospital were directly referable to the anæmia—that is to say, they were weakness, lassitude, shortness of breath, and rapid exhaustion on exertion. The European patient had a little redness and soreness of the tongue, but this condition was not noted in any of the other cases. A few of the patients complained of dyspepsia, but neither this nor diarrhœa was a constant symptom ; in no case were the stools suggestive of sprue. There

was no koilonychia noted, nor were there any skin changes. There were no symptoms suggestive of any general or special food deficiency; none of the patients was noticeably below the normal weight for their age and height, judged on the standards of their social classes. There were no nervous symptoms and the reflexes were normal.

Pathological examinations.—The hæmatological findings are summarised in Table I. The degree of macrocytosis and hyperchromia varied; in Case 7 the mean cell volume was very high indeed, 143 cu. μ (mean diameter by Price-Jones's method 8·178 μ) and it was even higher at the second examination (149 cu. μ) (Fig. 1); the mean corpuscular hæmoglobin was 46·2 γγ. The mean corpuscular hæmoglobin concentration was, however, fairly constant except in Case 3, the woman who had lost much blood at the birth of her child four months before, so that there was also an element of true secondary anæmia in her case. The initial reticulocyte count also varied, but here there was some definite association with splenic enlargement; in the 5 cases in which the spleen was enlarged the mean was 7·1 per cent. and in the others it was only 2·1 per cent. The white cell count was correlated inversely with the splenic enlargement; in those cases in which there was splenic enlargement, the mean of the counts was

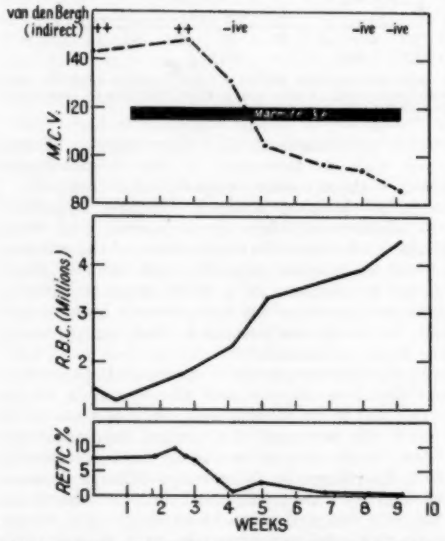

FIG. 1.—A case with very considerable macrocytosis, responding well to treatment but with little reticulocyte response.

3810, and, of the other cases, in 1 the count was low, in 3 more or less normal, and in 2 just above normal. Megaloblasts and normoblasts were found in 4 cases and in 1 other normoblasts alone in fair numbers; megaloblasts were found in 3 of the 5 splenomegalic cases. Some degree of anisocytosis and polychromasia was noted in 3 cases, but in the majority a feature of the blood picture was the absence of microcytes; a Price-Jones curve of Case 7 is shown (Fig. 2); it is strikingly different from the curve of pernicious anæmia.

For the gastric analyses the alcohol method was used, and histamine was not given in any of these cases. There was hypo-acidity in 3 cases. In 4 the gastric acidity was within the normal range; in 1 of these the free acid was never above 21 c.cm. but in the other 3 it was on the high side of the normal range. In 2 cases there was hyperchlorhydria, and in 2 others no test was done.

It is in the van den Bergh reaction and in the urobilin in the urine that my cases differ from tropical macrocytic anæmia as described by Dr. Wills. In 9 of the 11 cases the indirect van den Bergh test was definitely positive—1–2 units in 8 and about 3 units in the other—and in 2 cases there was no evidence of hyperbilirubinæmia; in 8 cases there was definite increase of urobilin and in 2 there was a slight increase; in 1 the urobilin estimation was not recorded.

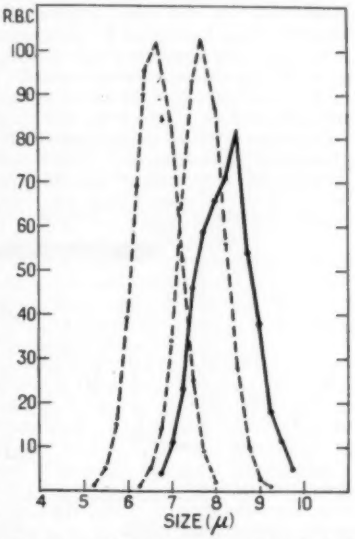

FIG. 2.—A Price-Jones curve in a typical case; there is complete absence of microcytes. (The broken lines are Price-Jones's extremes of the normal curves; in Indians the normal curve seldom seems to reach far above the 80 line.)

Response to treatment.—We found some difficulty in persuading patients to take marmite; Indians seem to dislike it particularly. The dose taken in all cases but two was ½ oz. daily; 1 had a drachm three times a day (Case 3, in whom there was a good reticulocyte response) and the other 2 dr. three times a day for the last six days of his treatment (Case 5). In the first 9 cases marmite was the only treatment given other than purgatives. In the last 2 ferrous sulphate in large doses (grs. 18 a day) in place of marmite was given for three weeks during the course of the treatment; in 1 case the increase in red cells was checked temporarily, and in neither case was there any reticulocyte response.

The response to treatment is shown in Table II., and charts of 3 cases are given in Figs. 1 and 3. In most of the cases a reticulocyte count was done on the 5th day of treatment and then every other day until the reticulocytes had fallen to normal or to a low level. It will be seen that all the cases did not respond with a classical reticulocytosis, and that the correlation between the reticulocyte response and the subsequent increase in red cells was not very high. The failure of the reticulocyte response was most noticeable in those cases in which the original reticulocyte level was moderately high. In Case 5, for example, the first red cell count was 1,770,000 and reticulocytes 4·5 per cent.; the reticulocytes rose to 6·8 per cent. only on the 5th day and had fallen again by the 7th, but the red cells increased by over a million in the first 7 days and by two millions in 16 days. On the other hand, Case 6, in which the reticulocytes were practically absent (0·2 per cent.) at the first examination and the red cell count was 2,430,000, showed a sharp reticulocyte rise to 6·9 per cent. on the 4th and 10 per cent. on the 6th day; the red cells increased by 1,700,000 in 16 days. The fact that in few of the cases

were the original red cell counts extremely low will explain the absence of reticulocyte response to some extent; both patients with an initial count in the region of a million showed a good response, but it will be seen that if these two cases are excluded there was not the same degree of the reticulocyte response that one sees in pernicious anæmia cases receiving liver, and yet the hæmopoietic response, as shown by the increase in red cells, was comparable to that which occurs in cases of pernicious anæmia treated with liver extract by the mouth.

Another possible explanation is that we were not giving sufficient marmite. We have now established a marmite "tradition" in the hospital amongst patients and nurses, and we are experiencing less difficulty in persuading the former to take it in larger doses. A female patient at present under treatment (not included in this series) who is taking 1 oz. a day, from an initial red cell count of 1,500,000 showed a 40 per cent. reticulocyte response on the 6th day.

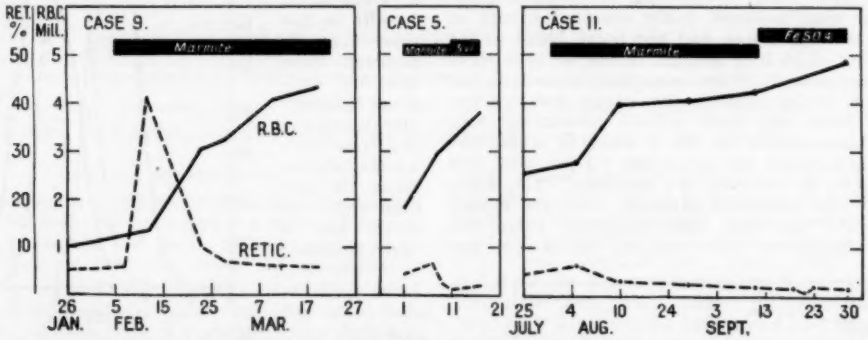

FIG. 3.—Cases 9 and 5: In each the hæmopoietic response is equally satisfactory; one shows a very marked and the other a very slight reticulocyte response. In Case 11, in which there was splenomegaly, there was a slow response to treatment; the addition of iron in the later stages seemed to help hæmopoiesis but there was no reticulocyte response.

In every case but one the reticulocyte level fell to normal or nearly so, and in most of the cases the van den Bergh (indirect test) became negative; the records on this point are not complete, but in 2 of the large spleen cases the van den Bergh test remained positive. The patients could not be persuaded to remain in hospital until their blood counts had risen to normal, but the colour-index was practically normal in all except 2 cases, when it was on the low side.

The response to treatment was not correlated (positively) with the initial gastric acidity; on the contrary the 3 cases that had the lowest gastric acidity showed a more rapid improvement than many of the others. In Case 7, the only case in which there was marked hypochlorhydria, a gastric analysis at the time he left hospital showed a normal curve with a maximum free acidity neutralised by 40 c.cm. N/10 NaOH.

In 5 cases in which there was splenic enlargement the spleen was markedly reduced at the time of discharge—to the costal margin in 3 cases and in Cases 10 and 11 to within 3 in. of the costal margin.

DISCUSSION

As this paper was primarily intended to be a clinical report, I do not wish to enter into a discussion as to the nature of this substance in marmite, whether it is Castle's extrinsic factor, a substance that stimulated the secretion of the hæmopoietic hormone (Greenspon, 1936 [5]), or an independent essential hæmopoietic principle, but for purposes of this discussion I will adopt the hypothesis that it is an independent hæmopoietic principle that is necessary for the complete maturation of the blood-cells, just as iron is, at a different level of hæmopoiesis.

Whilst Greenspon's interpretation of Castle's experiments is very convincing, and appears to do away with the necessity for an extrinsic factor, as such, and to simplify the pernicious anæmia problem, it leaves unexplained the action of the marmite principle in tropical macrocytic anæmia. His suggestion that, in conditions where "there is less damage to the secreting gastric mucosa," it stimulates these cells to form the antianæmic agent is nothing short of a guess, as in the first place there is no evidence that the mucosa is damaged at all in these cases. Though I do not wish to formulate a new hæmatological principle, without some experimental support, I cannot help thinking that, if Castle's hypothesis is to be abandoned, there is no necessity to bring an intrinsic factor into the explanation of the ætiology of tropical macrocytic anæmia, and that it would be simpler to assume, as I have done tentatively, that marmite contains an independent hæmopoietic principle, which is also present in liver and probably in other food substances.

Simple microcytic anæmia is due to a disproportion between the iron supply and the demands of the body—i.e., (*a*) to an actual deficiency of iron in the diet; (*b*) in the presence of a normal amount of iron in the diet, to the loss of iron from the body through chronic hæmorrhage, or to an extraordinary demand, as in pregnancy; or (*c*) to the failure of absorption as in achlorhydria and hypochlorhydria. The hæmolytic conditions do not give rise to a hypochromic iron-deficiency anæmia because the iron is not lost from the body but is stored and re-utilised.

Similarly, it is probable that in the case of tropical macrocytic anæmia the deficiency may be absolute, that is, due to an actual deficiency in intake of the special substance found in marmite; it may be relative, as in pregnancy where a normally sufficient supply becomes a deficiency in the presence of an extraordinary demand; or it may be a failure of absorption from the intestinal tract of the substance itself or of the substance into which it is converted. In this case, however, we do not know what happens in hæmolytic conditions; we do not know, for instance, whether, where there is an excessive destruction of red cells, the hæmopoietic substance that is the final product of the specific substance in marmite may not be completely broken down and excreted. If this is so, then the ætiological possibilities in this condition are widened.

Hitherto, a few cases of the so-called idiopathic tropical macrocytic anæmia in both men and women have been reported, but most of the cases described have been cases of macrocytic anæmia in pregnant women, and thus it is on the findings in these that accepted clinical and hæmatological picture of the disease is dependent. We do not, however, know which are the true specific characters of the pure deficiency and which are the characters dependent on the other ætiological factors. For example, Dr. Wills has suggested that pregnancy might possibly account for the slight leucocytosis that is so often found, and it has also been suggested that the low gastric acidity noted in her cases might be accounted for on the same grounds. Again, in the present series the positive indirect van den Bergh and the high initial reticulocytosis may be due to some excess hæmolysis, such as that which occurs in chronic malaria.

Among the cases shown in the two Tables there are 3 patients (Cases 5, 6, and 7) in which there seems reason to suppose that the condition was due to a dietary deficiency. All were pure vegetarians who did not even take eggs. There was no rich source of vitamin B in their dietary, and in all three polished rice was used and provided the bulk of their calories. None of the three, however, was indigent; one was a student, one a watchman at a mill, and the third a milkman; but they all put on weight whilst in hospital, on a vegetarian diet—probably a fuller one and better selected than their home diet. Cases 5 and 6 were apparently normal except for the anæmia and other signs and symptoms directly referable to it. Case 7 had an enlarged spleen, about 4 in. below the costal margin. All three responded very well to marmite.

Of the female patients, one was on a good mixed diet, and one on a moderate mixed diet, one was a poor Anglo-Indian probably on a poor diet and the other was on a vegetarian diet, but she took eggs and milk. It is not at all clear what the cause was in these first 2 cases, but in the last 2 diet might certainly have been defective, and the Anglo-Indian woman (Case 3) had lost blood at the birth of her child and had been feeding him ever since.

In the last 4 cases there was marked splenic enlargement with irregular bouts of fever. Active malaria was excluded by repeated blood examinations and kala-azar by spleen puncture and the serum tests. These cases might well have been classed as "Bengal splenomegaly," a condition the ætiology of which is not clear. In 2 the spleen puncture showed that there were areas of active hæmopoiesis in the spleen, and at the time of discharge there was no evidence in the spleen puncture smear that this condition still existed, but of course this may only mean that the needle did not again happen to strike an area of hæmopoiesis. The excess of urobilin in the urine and hyperbilirubinæmia in 3 of these cases and a relatively high reticulocyte count in all 4 suggests that there was increased destruction of red blood-cells; for this the spleen might be responsible, but there was also hyperbilirubinæmia in all but one of the other cases in which the spleen was not enlarged, and a reticulocyte count well above normal in about half of them. At the time of discharge, although the blood picture had not quite returned to normal, the spleen was reduced in size very considerably, the indirect van den Bergh reaction was negative in 2, and the reticulocytes percentage was very low in 3 of the 4 cases. It is difficult to see how the supplying of a dietetic deficiency could bring this about, unless the splenic enlargement was mainly due to the presence of much extramedullary hæmopoietic tissue which atrophied when normal hæmopoiesis was re-established.

To summarise the ætiology in the cases reported, it seems clear that, although a deficiency in the "marmite principle" was *one* of the causes, and since the supplying of this deficiency alone brought about very considerable improvement in all and, we have every reason to believe, complete cure in several, the cases in this series do not form a homogeneous group from an ætiological point of view, nor can any of them be placed in the same ætiological group with Wills's macrocytic anæmia of pregnancy, despite the common factor of their cure by marmite.

The hyperbilirubinæmia in 9 out of 11 cases remains unexplained. Dr. Wills is emphatic that it is usually absent in her cases, though (if Castle's theory is accepted in toto) it is not clear to me why the absence of the extrinsic factor should have a result so different in this respect from that produced by the absence of the intrinsic factor, as the final result is a deficiency of the same hæmopoietic principle.

Two groups can be made out in this series, Cases 2, 3, 5, and 6 in which there was evidence of dietary deficiency, and Cases 8, 9, 10, and 11 in which there was splenic enlargement and evidence of excessive hæmolysis; Case 7 falls into both groups and the other two (Cases 1 and 4) we must leave out of consideration. In the first group, the initial reticulocyte count was low—1·1, 1·0, 0·2, and 4·5 per cent. respectively—whereas in the others it is comparatively high. It is suggested tentatively that in the second group some hæmolytic condition brings about a relative deficiency in this specific hæmopoietic (marmite) principle in persons who are on a diet low, though not necessarily actually deficient, in this factor.

From experience not yet reported, we have noticed that amongst a group of tea-garden coolies who apparently all live on the same suboptimal diet, in the presence of a heavy hookworm infection when the blood is lost into the intestinal tract, the anæmia that develops is nearly always microcytic, but that, in those cases in which there is evidence of hæmolysis, the anæmia is usually normocytic or macrocytic; the difference may be that in the hæmolytic group, whereas the iron is stored and re-utilised, the other hæmopoietic factor is broken down and cannot be used again.

SUMMARY

Among the cases of anæmia admitted to the Hospital for Tropical Diseases in Calcutta during the last year, there were 11 cases of macrocytic anæmia that responded to treatment with marmite; 4 of these patients were non-pregnant women and 7 were men. The hæmatological findings in these cases are similar to the findings in Wills's tropical macrocytic anæmia, except that the indirect van den Bergh reaction was positive in 9, and there was other evidence of increased blood destruction.

It seems that, in addition to the vitamin-B complex deficiency, there must be other causes of this condition. It is suggested that excess hæmolysis of red cells may be an associated factor in this macrocytic anæmia.

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CLINICAL AND LABORATORY NOTES

TOXIC PSYCHOSIS FOLLOWING MEASLES

By H. R. Bathurst Norman, M.B. Oxon., M.R.C.P. Lond.

Welch and Schamberg [1] mention nervous and mental complications of measles as infrequent, appearing only in persons of neurotic antecedents. Ford,[2] on the other hand, in a survey of the literature, finds that during convalescence transient mental disturbances are common and prolonged toxic psychosis may develop. In such cases there has usually been high fever and delirium at the onset of the disease. He quotes Sotow, who collected records of 11 cases of this nature. In most of these delirium and hallucinations first occurred during the period of incubation, but in two reported by Henoch, mental disturbance only manifested itself during the third and seventh weeks after the appearance of the rash. Martinez and Gerde [3] describe two cases of psychosis complicating measles in young adults, in both of which the symptoms made their appearance with convalescence and the patients gave a psychopathic history.

On the whole the prognosis appears to be favourable in these toxic delirious states. It is evident that the part played in their incidence by the temperament of the subject is very important. In the following case the condition was possibly avoidable.

A schoolboy of 15, healthy but somewhat excitable, developed fever and coryza during an epidemic of measles. Next day a rash appeared, and on the third day the temperature rose to 104° F. and the pulse-rate was 124. There was occasional vomiting, and cough was troublesome. The temperature then began to fall, and on the fifth day from the appearance of the rash it was normal. During the acute stage the patient was very restless at night and had little sleep. The course of the illness, however, had not been especially severe, and his condition seemed perfectly satisfactory.

On the night of the first day after the resumption of a normal temperature, at 11 P.M., the patient was found walking down a corridor wearing his dressing-gown and slippers. He was in a delusional state and thought he was at home instead of at school and that there were burglars in the house. When spoken to he answered shortly but intelligently but at once began again to wander mentally. He was put back to bed, but during the night he remained restless and wakeful. His delusions were without coherence and continued throughout the next day. He had also visual hallucinations at this time. He could readily be roused and would answer questions normally, but always his mind wandered after two or three minutes' conversation. Towards evening his condition seemed to get rather worse. He disliked his food and complained that the water given him to drink was bad. It was only with much coaxing that he could be persuaded to take anything to eat. He was also confused as to time. His surroundings seemed to change constantly, although he was accurate in recognising anyone entering his room. That evening he was given an injection of hyoscine hydrobromide, gr. 1/200, and later morphia, gr. 1/6. He then slept for twelve hours and the next day was drowsy but quite sensible.

Throughout the period of mental disturbance the temperature was normal and the neurological and medical examinations were alike negative. The urine contained a trace of albumin but was otherwise normal. There were no further delusions, and after a short period of convalescence the patient was able to return home. Two months later he was seen in consultation by Dr. H. L. Tidy and Dr. W. R. Reynell. He was then complaining of vague anxiety, nervousness at night, and failure of memory. Physical examination was again negative apart from an attack of tachycardia while being examined. He seemed perfectly well except for these occasional paroxysmal attacks of mild psychological disturbance. A favourable prognosis was given with the proviso that he should rest from work for a further period of three months.

A point of some interest in the case was that the patient's sister, after an attack of measles at puberty, had similar psychological symptoms from which she made a satisfactory recovery.

Lack of rest during the febrile stage of an acute exanthem may precipitate a toxic psychosis in a child of unstable temperament. This is particularly likely to happen when puberty is a complicating factor. The immediate improvement in this case when adequate rest was obtained emphasises the importance of ensuring that an excitable patient has a proper amount of sleep during the acute phases of his illness. This may be easily overlooked if the actual attack is mild.

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UNDULANT FEVER TREATED WITH FOUADIN

By G. M. Tanner, M.B. Camb.

HON. SURGEON TO THE NEWTON ABBOT HOSPITAL, DEVON

Neumann [1] has lately reported a short series of cases of undulant fever treated with the new antimony preparation called Fouadin. The invalidism resulting from this disease is so long in the absence of any specific treatment (Rainsford [2] gives it as six months or more in half the cases), and the results of vaccine treatment are so uncertain owing to the severity of reactions, that an effective remedy would be extremely valuable. The comparative rarity of undulant fever in England makes it seem worth while to publish the details of a single case.

On April 25th last I was called to see a schoolmaster, aged 25, who thought that he was suffering from influenza, and who wished to know if he would be fit to return to his school two days later. The symptoms complained of were aching all over, profuse sweating (following a period of shivering), and anorexia. His temperature was 103° F., and as there were no other signs or symptoms, his own diagnosis appeared to be correct. He was put to bed and given appropriate treatment, but his temperature did not subside, and continued to swing from 98·2° F. in the morning to 102–103·6° at night, with profuse sweats but with very little feeling of illness, and with a pulse-rate never above 100. There was no cough, and after the first day no pain, and the appetite was fairly good. The tongue was moist and only slightly coated. The urine was of a high colour but otherwise normal, and no other signs or symptoms were discovered. A Widal test was therefore done on April 30th, and the report of this test was: "Agglutination observed against *Brucella abortus* and *Br. melitensis*, up to a serum dilution of 1/2560. No agglutination observed against all members of the enteric group."

It was fortunate that Neumann's paper was published on the same day that the above report reached me. A supply of fouadin was therefore ordered and given as suggested—1·5, 3·5, and 5·0 c.cm. on successive days,

[1] Neumann, C. Z.: THE LANCET, 1936, i., 1001.
[2] Rainsford, S. G.: Jour. Roy. Naval Med. Serv., 1935, xxi., 81 and 182.

and then seven more doses of 5·0 c.cm. on alternate days.[a] It was given by intramuscular injection into alternate buttocks. There was no unfavourable reaction either local or general, and the temperature began to subside after the second dose. The course of injections was completed on May 22nd, and on May 24th the patient commenced to get up. He was able to return to work on June 22nd, eight weeks after I first saw him. He completed the last month of the school term without any difficulty, and when he came to see me on August 14th he reported that there had been no return of fever or other untoward symptoms, and that he was then quite fit. He has again reported fit on Sept. 2nd.

The patient, who had not been out of England, presumably caught the disease by drinking raw milk while on a walking tour in the East of England a short while before.

I am indebted to Dr. H. A. Fielden, of Torquay, for his pathological investigation.

[a] The drug is supplied by Messrs. Bayer Ltd. in boxes of ten ampoules, in the doses given above—namely, one of 1·5 c.cm., one of 3·5 c.cm., and eight of 5·0 c.cm., all ready for one complete course.

BRITISH MEDICAL ASSOCIATION

MEETING AT OXFORD

SECTION OF DISEASES OF CHILDREN

AT a meeting of this section, with Dr. FRANCES BRAID (Birmingham) in the chair, a discussion on

Wasting in Infancy

was opened by Dr. R. C. JEWESBURY (London). He defined wasting as a condition of malnutrition of the infant from any cause. He classified the causes under the headings of dietetic errors, infection, environment, constitutional causes, birth injuries, prematurity, and marasmus or infantile atrophy. He believed the wasting associated with dietetic errors to be due to a lack of proper coördination between the food and the ability of the child to digest and assimilate it. Whilst healthy infants had a wide margin of tolerance, each had its own limitations. He quoted from his experience at the Mothercraft Training School, which showed that, of infants suffering from excessive malnutrition, 58 were breast-fed and 152 bottle-fed. He stressed the great importance of breast-feeding; his series gave a mortality-rate of nil in the breast-fed and 6·5 per cent. in the bottle-fed series; similarly the average stay in hospital was 32·3 days for the former and 82·3 in the latter. Among the breast-fed babies insufficient quantity of breast milk was the chief cause of wasting, and he emphasised the value of test-feeding in this connexion. In the other groups, early weaning followed by unsuitable feeding was usually at fault.

In breast-feeding, quantity was usually the difficulty. With the exception of excessive fat, which might be raised to 6 or 7 per cent. and so be liable to cause considerable upset, breast milk was extraordinarily stable in composition. Whilst local conditions of the breast might cause trouble, most failures came from mismanagement. Antenatal training and proper diet in pregnancy, which should be watched at antenatal clinics, should be followed by instruction from the maternity nurse and then from the infant welfare centre. In the bottle-fed child, the chief cause of wasting was unsuitable food, often frequently changed from one to another. In other cases too much or too little quantity for the caloric needs was used; excess fat often caused trouble that led to its reduction or omission till the caloric value fell considerably, unless made up with sugar or protein. He believed that for the first six months a proportion of 1·6 per cent. protein was correct. This was present in half-strength cows' milk, otherwise properly modified by the addition of sugar and fat and given in correct quantities, which was perfectly satisfactory. Re-education after upset met with the difficulty of getting the child to take enough bulk to make up its weight. Concentrated mixtures might be valuable. This might cause irritation and he believed in working up gradually to the full feed. Dealing with infection he thought it important to search for foci such as otitis media, mastoid disease, and pyelitis. The environmental conditions—lack of fresh air and light, and bad housing among the poor—were perhaps more frequent than lack of food; mothercraft was also an important preventive. Marasmus he took to be the wasted condition that resulted from more or less complete non-absorption of food for no very obvious reason, the child wasting progressively and passing large undigested stools. The condition seldom arose in the breast-fed infant. He would like to see a service for the supply of breast milk in this country, since this milk was essential for the treatment of marasmus. He had lately been giving 20–40 c.cm. of whole blood by intramuscular injection to these infants when toxæmia was severe and he believed the results warranted further trial. He used lactic acid milk when breast milk was not available. Summarising, he said that wasting was due to two main causes—errors in diet and pathological conditions.

Dr. H. T. ASHBY (Manchester) believed that underfeeding was by far the most common cause of wasting. Although the test-feed was valuable for showing the quantity of food, it gave no evidence as to quality. It was important to encourage breast-feeding, and he considered the nervy, restless infant of the nervy mother a very difficult problem. Excess fat in the feed was often a cause of trouble though high protein seldom worried the infant. A fairly large teat was necessary to enable the baby to get its feed. In the treatment of wasting he considered good mothering, warmth, and accurate weighing essential. He believed that vitamins were now often given in excess thus producing wasting.

Dr. C. K. J. HAMILTON (London) said that in his series 70 per cent. were underfed. This was often due to the giving of too dilute a mixture in the mistaken idea that the wasting infant was suffering from overfeeding. Habit vomiting was a common cause and, in a nervous child, might go on to rumination. Whereas acute infections had been stressed as an obvious cause, cases of mild respiratory or skin infections usually from poor homes often escaped detection. These cases ran an irregular temperature and had low hæmoglobin values. The breast-fed infant was less often affected because of the protective value of the mother's milk. In treatment he advocated removal of the cause, followed by adequate diet; this should be calculated at 50 calories per lb. of expected weight. Concentrated breast milk—i.e., 3 oz. boiled down to 2 oz.—was valuable. He believed in keeping the protein content high and producing a fine curd with lactic acid.

Dr. J. V. C. BRAITHWAITE (Leicester), referring to the opening paper, did not accept the term marasmus and was surprised at so high an incidence of alimentary cases. He also believed in the importance of infection as a cause of wasting and advocated sedatives to procure sleep for the restless, nervy baby. In bottle

feeding he disapproved of raising fat values and he condemned lactose as producing fermentation.

Dr. W. E. CROSBIE (Liverpool) described various types of ear infection. He quoted statistics showing that the mortality-rate varied with the nutrition before admission.—Dr. K. H. TALLERMAN (London) thought starvation was a more important factor than infection. Dilute feeds played a part and the formula of 2½ oz. of fluid per lb. only held good for normal children, since it might prove too bulky. In these cases he advocated concentrated feeds. He also disliked the term marasmus.

Dr. C. H. D. ASHER (Liverpool) believed marasmus to be due to endocrine deficiency. She thought that where other methods failed, sugar-tolerance tests should be made and insulin given when indicated. She quoted a case where a gain of 1 lb. after four months in hospital on usual treatment had changed to one of ½ lb. per week with insulin. She believed that thyroid also had a place in treatment.

Dr. CICELY WILLIAMS (Gold Coast) described feeding difficulties amongst native races. She believed mothering and frequent feeds to be valuable, and also held that teats should be large enough to provide a spray of milk such as came from the breast of native women.—The CHAIRMAN believed that four hourly feeding from birth was wrong. She was not convinced that infection was not secondary to malnutrition.

Dr. JEWESBURY, in reply, thought there was danger in the degree of warmth advocated by Dr. Ashby. He thought that possibly the term marasmus should be dropped. He agreed that when insulin was given with glucose it would increase weight, but he doubted whether this was a wise procedure. He did not approve of the constant handling or easy teats advocated by Dr. Williams.

Dr. C. F. HARRIS (London) took the chair at the discussion on

Diabetes in Children

which followed, and Dr. W. W. PAYNE (London) reported on 71 cases (44 boys and 27 girls) treated by him during the past ten years. In no case were the parents diabetic, although in 23 per cent. there was a family history of the disease, and it tended to miss a generation. There were 10 deaths. In the majority of cases the symptoms had been classical and usually only 1–4 weeks had elapsed between apparent health and the fully developed disease. Occasionally there had been some months of lassitude, with or without enuresis. Two children who later developed true diabetes were first discovered on routine examination of the urine. Dr. Payne believed that some of these cases of glycosuria might be prevented from developing symptoms for many years if given a correctly balanced diet; he urged the value of testing the urine for sugar in all cases of debility or failure to gain weight. Dr. Payne gave tables showing that children might develop normally on a diet of considerably less calories than Holt's or the League of Nations figures. These children showed an improved carbohydrate tolerance on increasing the carbohydrate: fat ratio. So long as the calorific value was unaltered, altering this ratio from 0·5 or 0·6 to 2·0 or 2·5 (which might allow an increase of 80 to 120 g. of carbohydrate per day) made little, if any, difference to the demand for insulin, and occasionally less was needed. He showed that calorie value rather than carbohydrate content influenced the insulin requirement. He then prescribed a diet practically normal excepting that foodstuffs of unknown composition were not used. He thought a consistently high blood-sugar even in the absence of symptoms, allowed the disease to progress more rapidly. There was the serious difficulty in children whose blood-sugar tended to be extraordinarily unstable, making it difficult to avoid hypoglycæmia. He advocated two insulin injections and intermediate meals. He occasionally used the modern "free" diet in older and more stable children. He was trying protamine insulinate and had had one case with considerable improvement. Psychic effects should be minimised and successful treatment should allow a normal life with work, play, swimming, and so forth. He forbade cycling in traffic owing to the risk of loss of balance from an attack of hypoglycæmia.

Hypoglycæmic symptoms usually appeared at a blood-sugar level of 0·05 per cent., though one child had symptoms at 0·16 per cent. In addition to hunger, shakiness, sweats, drowsiness, and coma children showed abdominal symptoms, fretfulness, tearfulness, and bad temper. Usually sugar by mouth cured the condition, but adrenaline and pituitary extract with intravenous glucose might be required. If hypoglycæmic symptoms [redacted] persist, normal mentality might [redacted] months. Dr. Payne describ[redacted] nausea and vomiting to [redacted] ect. He believed the [redacted] which in turn caused [redacted] gether with the [redacted] then produced [redacted] pass into diabe[redacted] precipitated [redacted] the periodic bi[redacted]

Dr. LESL[redacted] per on 21 cases of [redacted] 9 girls) covering appr[redacted] ars. Like Dr. Payne he [redacted] th diabetic parents, though th[redacted] in other relations. Three of his cases [redacted] ped within six weeks of an attack of mumps and in two of these there had been epigastric pain during the attack. He had found 5 similar cases recorded and he thought that diabetes might not be a rare complication, since the islet tissue had been described as involved in acute pancreatitis, and Gundersen had described a rise in the death-rate from diabetes in the young after an epidemic of mumps. Urine should therefore be watched after attacks of mumps where there had been epigastric pain. The onset was sudden, and he urged that insulin should be given without delay. He preferred a low diet for the first six months and gave only 100–120 g. of carbohydrate to a child of 10 or 12. He had difficulty in controlling both glycosuria and blood-sugar in 40–50 per cent. of cases. Progress in growth and activity had been good but 4 cases had not established menstruation normally. Seven patients had developed diabetic coma, but only in one, who had developed acute empyema of the antrum, was the patient taking the prescribed dose of insulin. Hypoglycæmic coma had occurred nine times with no deaths.

Dr. P. C. MALLAM (Oxford) doubted whether many of these children survived 25 years of age. He suggested that alkalis as a routine might prevent the acidæmia of coma.

The CHAIRMAN described two cases where accidental injection of insulin into a vein had caused hypoglycæmic coma within ten minutes.

Dr. PAYNE, in replying to Dr. Cole, said he had had less returns to hospital since using high carbohydrate diets from the start. Mumps had not immediately preceded any of his cases, nor had an attack influenced

any established case. Only about 30–40 per cent. of his cases were completely controlled in both blood-sugar and glycosuria. With regard to sexual development, most of his children had not yet reached puberty; one girl of 18 was noted as having a small uterus at an appendix operation. Some of his boys had not grown normally, and he thought some other endocrine disturbance might be at fault. He believed Dr. Mallam to be unduly pessimistic about the prognosis. He only gave alkalis to children liable to periodic vomiting; when ketosis was present he considered that treatment had been inadequate.

SECTION OF OPHTHALMOLOGY

AT a meeting of this section, with Mr. J. W. TUDOR THOMAS (Cardiff) and subsequently Mr. P. E. H. ADAMS (Oxford), the president, in the chair, a paper on

Glaucoma and Sepsis

was read by Dr. R. A. KERRY (Montreal). He distinguished between posterior and anterior glaucoma, the posterior variety being due to uveitis and characterised by diffuse infiltration of the optic nerve with loss of tissue, whilst anterior glaucoma due to cyclitis was shown by hypertension and a shallow anterior chamber, due to the pushing forward of the iris by the swollen ciliary body. He recalled a previous publication of his showing the presence of attenuated staphylococci in glaucomatous eyes and he held that the primary source of glaucoma was to be sought in the infected nose and sinuses.

Mr. J. COLE MARSHALL (London) read a paper on the present position of operative treatment in

Detachment of the Retina

He said that in technique some of the most important advances had been in localising the tear. Several surgeons employed the "katholysis" method of Vogt in which a long needle was used—long enough to enter the vitreous so that on the tracer bubbles of hydrogen could be seen. The current varied greatly, and if bubbles were not seen the needle had to be re-entered at the same spot, the current increased, and the time prolonged. Vogt worked with a current of 2–4 milliamperes for 1–6 secs. A diathermy needle could be used, the needle being inserted till the length was found at which the point caused a cloudy spot on the retina like early tubercle of the choroid. A method now in vogue, especially on the continent, was to watch the effect of the punctures and even of surface coagulation during the operation. For this the best illuminant was a 500 candle-power lamp and a condensing lens of 20 sph. with a metal ophthalmoscope that could be sterilised. The method could be made easier by employing the special spoon-shaped speculum of Alruga and marking the spot of light corresponding to the tear on the sclera; for tears far back a special periscope suggested by Manen of Utrecht was useful. As for new instruments a great advance was Dr. Facouet Pesine's "controlleur pyrometrique." It could be fixed to any diathermy machine and was thus far simpler than Coppez's pyrometric method. The coagulation point could be kept at a definite temperature of 90° C. The method of electrolysis, which was now gaining ground, depended on the use of very fine needles, of either steel or irido-platinum. The finer and sharper the needle, the easier it was to introduce and the less fluid was lost. In tears, the edges of which stood strongly away from the choroid, the electrolysis method had to be supplemented by diathermy, not only to obtain stronger scars but to allow freer drainage of the subretinal fluid. The strength of the current varied from 1 to 4 milliamperes and the time from 1 to 6 secs.

A lively discussion followed in which Dr. L. MITCHELL (Melbourne), Mr. T. HARRISON BUTLER (Birmingham), Mr. J. GRAY CLEGG (Manchester), Mr. A. PALIN (London), and Mr. H. CAIGER (Sheffield) took part.

In a paper on

Divergent Strabismus

Miss E. E. CASS (London) said that the condition was due either to primary convergence insufficiency or to primary divergence excess. The majority of divergent squints arose from a convergence insufficiency. In only 10 per cent. of cases was there myopia; consecutive divergents were hypermetropic, while patients showing divergence excess were never myopic. Binocular rivalry varied considerably, especially in cases with a master eye, and in divergent excess binocular rivalry made it impossible to "put the bird in the cage," but fusion and stereoscopic vision were normal. Amblyopia and false correspondence were rare with divergent strabismus, and very few cases were anisometropic. Convergence insufficiency arose from a variety of causes—e.g., high hypermetropia, hyperphoria, and muscle weakness. In cases with a small angle and without hyperphoria binocular vision was always preserved, but with a large angle or associated with a hyperphoria in early life it was deficient.

In treatment, she held that glasses were of little use except in cases associated with myopia. Orthoptic exercises were useful in coöperating patients. Cases of divergence excess and small-angle squints were the most suitable for training. This was in three stages: breaking down of suppression and eliciting diplopia; improving fusion and giving amplitude; and correlating accommodation and convergence so that the patient could get binocular vision for every distance.

Dr. W. H. SUMMERSKILL (London) read a paper on the restoration of the visual and fusion functions of

The Amblyopic Eye

He described amblyopia as a functional block to perception and he thought there were two varieties, a passive type, the result of incomplete facilitation of the visual arc, and a purposive type, in which there was deliberate suppression. He emphasised the psychological aspect of amblyopia and advocated therapeutic suggestion with the patient in the hypnoidal state. In addition, orthoptic treatment was carried out. Of 34 cases which he had treated, 19 had obtained 6/6 or 6/5 vision.

Sir JAMES BARRETT (Melbourne) said that congenital amblyopia was extremely rare and that such an eye had never been examined histologically.

Prof. W. BURRIDGE (Lucknow) read a paper on some

Fundamentals of Vision

with remarks on night-blindness. He said that it had so far been tacitly assumed that the electrical stimulation of isolated muscle or nerve was a natural stimulation. As a result all classical explanations of the phenomena of retinal stimulation included the assumptions that the end-organ had inherent quiescence until excited to activity, and that its stimulation was a process akin to the excitation of muscle or nerve by electric currents. It was found, however, that natural stimulation could also be

feeding he disapproved of raising fat values and he condemned lactose as producing fermentation.

Dr. W. E. CROSBIE (Liverpool) described various types of ear infection. He quoted statistics showing that the mortality-rate varied with the nutrition before admission.—Dr. K. H. TALLERMAN (London) thought starvation was a more important factor than infection. Dilute feeds played a part and the formula of 2½ oz. of fluid per lb. only held good for normal children, since it might prove too bulky. In these cases he advocated concentrated feeds. He also disliked the term marasmus.

Dr. C. H. D. ASHER (Liverpool) believed marasmus to be due to endocrine deficiency. She thought that where other methods failed, sugar-tolerance tests should be made and insulin given when indicated. She quoted a case where a gain of 1 lb. after four months in hospital on usual treatment had changed to one of ½ lb. per week with insulin. She believed that thyroid also had a place in treatment.

Dr. CICELY WILLIAMS (Gold Coast) described feeding difficulties amongst native races. She believed mothering and frequent feeds to be valuable, and also held that teats should be large enough to provide a spray of milk such as came from the breast of native women.—The CHAIRMAN believed that four hourly feeding from birth was wrong. She was not convinced that infection was not secondary to malnutrition.

Dr. JEWESBURY, in reply, thought there was danger in the degree of warmth advocated by Dr. Ashby. He thought that possibly the term marasmus should be dropped. He agreed that when insulin was given with glucose it would increase weight, but he doubted whether this was a wise procedure. He did not approve of the constant handling or easy teats advocated by Dr. Williams.

Dr. C. F. HARRIS (London) took the chair at the discussion on

Diabetes in Children

which followed, and Dr. W. W. PAYNE (London) reported on 71 cases (44 boys and 27 girls) treated by him during the past ten years. In no case were the parents diabetic, although in 23 per cent. there was a family history of the disease, and it tended to miss a generation. There were 10 deaths. In the majority of cases the symptoms had been classical and usually only 1–4 weeks had elapsed between apparent health and the fully developed disease. Occasionally there had been some months of lassitude, with or without enuresis. Two children who later developed true diabetes were first discovered on routine examination of the urine. Dr. Payne believed that some of these cases of glycosuria might be prevented from developing symptoms for many years if given a correctly balanced diet; he urged the value of testing the urine for sugar in all cases of debility or failure to gain weight. Dr. Payne gave tables showing that children might develop normally on a diet of considerably less calories than Holt's or the League of Nations figures. These children showed an improved carbohydrate tolerance on increasing the carbohydrate: fat ratio. So long as the calorific value was unaltered, altering this ratio from 0·5 or 0·6 to 2·0 or 2·5 (which might allow an increase of 80 to 120 g. of carbohydrate per day) made little, if any, difference to the demand for insulin, and occasionally less was needed. He showed that calorie value rather than carbohydrate content influenced the insulin requirement. He then prescribed a diet practically normal excepting that foodstuffs of unknown composition were not used. He thought a consistently high blood-sugar even in the absence of symptoms, allowed the disease to progress more rapidly. There was the serious difficulty in children whose blood-sugar tended to be extraordinarily unstable, making it difficult to avoid hypoglycæmia. He advocated two insulin injections and intermediate meals. He occasionally used the modern "free" diet in older and more stable children. He was trying protamine insulinate and had had one case with considerable improvement. Psychic effects should be minimised and successful treatment should allow a normal life with work, play, swimming, and so forth. He forbade cycling in traffic owing to the risk of loss of balance from an attack of hypoglycæmia.

Hypoglycæmic symptoms usually appeared at a blood-sugar level of 0·05 per cent., though one child had symptoms at 0·16 per cent. In addition to hunger, shakiness, sweats, drowsiness, and coma children showed abdominal symptoms, fretfulness, tearfulness, and bad temper. Usually sugar by mouth cured the condition, but adrenaline and pituitary extract with intravenous glucose might be required. If hypoglycæmic symptoms were allowed to persist, normal mentality might not return for six months. Dr. Payne described the periodic attacks of nausea and vomiting to which these children were subject. He believed them to be due to hypoglycæmia, which in turn caused out-pouring of adrenaline. This, together with the fasting entailed by the symptoms, then produced ketosis and from this the child might pass into diabetic coma. Excitement and infection precipitated these attacks showing a kinship with the periodic bilious attacks of other children.

Dr. LESLIE COLE (Cambridge) read a paper on 21 cases of diabetes mellitus (12 boys and 9 girls) covering approximately 110 diabetic years. Like Dr. Payne he had had no patient with diabetic parents, though the disease appeared in other relations. Three of his cases developed within six weeks of an attack of mumps and in two of these there had been epigastric pain during the attack. He had found 5 similar cases recorded and he thought that diabetes might not be a rare complication, since the islet tissue had been described as involved in acute pancreatitis, and Gundersen had described a rise in the death-rate from diabetes in the young after an epidemic of mumps. Urine should therefore be watched after attacks of mumps where there had been epigastric pain. The onset was sudden, and he urged that insulin should be given without delay. He preferred a low diet for the first six months and gave only 100–120 g. of carbohydrate to a child of 10 or 12. He had difficulty in controlling both glycosuria and blood-sugar in 40–50 per cent. of cases. Progress in growth and activity had been good but 4 cases had not established menstruation normally. Seven patients had developed diabetic coma, but only in one, who had developed acute empyema of the antrum, was the patient taking the prescribed dose of insulin. Hypoglycæmic coma had occurred nine times with no deaths.

Dr. P. C. MALLAM (Oxford) doubted whether many of these children survived 25 years of age. He suggested that alkalis as a routine might prevent the acidæmia of coma.

The CHAIRMAN described two cases where accidental injection of insulin into a vein had caused hypoglycæmic coma within ten minutes.

Dr. PAYNE, in replying to Dr. Cole, said he had had less returns to hospital since using high carbohydrate diets from the start. Mumps had not immediately preceded any of his cases, nor had an attack influenced

any established case. Only about 30–40 per cent. of his cases were completely controlled in both blood-sugar and glycosuria. With regard to sexual development, most of his children had not yet reached puberty; one girl of 18 was noted as having a small uterus at an appendix operation. Some of his boys had not grown normally, and he thought some other endocrine disturbance might be at fault. He believed Dr. Mallam to be unduly pessimistic about the prognosis. He only gave alkalis to children liable to periodic vomiting; when ketosis was present he considered that treatment had been inadequate.

SECTION OF OPHTHALMOLOGY

AT a meeting of this section, with Mr. J. W. TUDOR THOMAS (Cardiff) and subsequently Mr. P. E. H. ADAMS (Oxford), the president, in the chair, a paper on

Glaucoma and Sepsis

was read by Dr. R. A. KERRY (Montreal). He distinguished between posterior and anterior glaucoma, the posterior variety being due to uveitis and characterised by diffuse infiltration of the optic nerve with loss of tissue, whilst anterior glaucoma due to cyclitis was shown by hypertension and a shallow anterior chamber, due to the pushing forward of the iris by the swollen ciliary body. He recalled a previous publication of his showing the presence of attenuated staphylococci in glaucomatous eyes and he held that the primary source of glaucoma was to be sought in the infected nose and sinuses.

Mr. J. COLE MARSHALL (London) read a paper on the present position of operative treatment in

Detachment of the Retina

He said that in technique some of the most important advances had been in localising the tear. Several surgeons employed the "katholysis" method of Vogt in which a long needle was used—long enough to enter the vitreous so that on the tracer bubbles of hydrogen could be seen. The current varied greatly, and if bubbles were not seen the needle had to be re-entered at the same spot, the current increased, and the time prolonged. Vogt worked with a current of 2–4 milliamperes for 1–6 secs. A diathermy needle could be used, the needle being inserted till the length was found at which the point caused a cloudy spot on the retina like early tubercle of the choroid. A method now in vogue, especially on the continent, was to watch the effect of the punctures and even of surface coagulation during the operation. For this the best illuminant was a 500 candle-power lamp and a condensing lens of 20 sph. with a metal ophthalmoscope that could be sterilised. The method could be made easier by employing the special spoon-shaped speculum of Alruga and marking the spot of light corresponding to the tear on the sclera; for tears far back a special periscope suggested by Manen of Utrecht was useful. As for new instruments a great advance was Dr. Facouet Pesine's "controlleur pyrometrique." It could be fixed to any diathermy machine and was thus far simpler than Coppez's pyrometric method. The coagulation point could be kept at a definite temperature of 90° C. The method of electrolysis, which was now gaining ground, depended on the use of very fine needles, of either steel or irido-platinum. The finer and sharper the needle, the easier it was to introduce and the less fluid was lost. In tears, the edges of which stood strongly away from the choroid, the electrolysis method had to be supplemented by diathermy, not only to obtain stronger scars but to allow freer drainage of the subretinal fluid. The strength of the current varied from 1 to 4 milliamperes and the time from 1 to 6 secs.

A lively discussion followed in which Dr. L. MITCHELL (Melbourne), Mr. T. HARRISON BUTLER (Birmingham), Mr. J. GRAY CLEGG (Manchester), Mr. A. PALIN (London), and Mr. H. CAIGER (Sheffield) took part.

In a paper on

Divergent Strabismus

Miss E. E. CASS (London) said that the condition was due either to primary convergence insufficiency or to primary divergence excess. The majority of divergent squints arose from a convergence insufficiency. In only 10 per cent. of cases was there myopia; consecutive divergents were hypermetropic, while patients showing divergence excess were never myopic. Binocular rivalry varied considerably, especially in cases with a master eye, and in divergent excess binocular rivalry made it impossible to "put the bird in the cage," but fusion and stereoscopic vision were normal. Amblyopia and false correspondence were rare with divergent strabismus, and very few cases were anisometropic. Convergence insufficiency arose from a variety of causes—e.g., high hypermetropia, hyperphoria, and muscle weakness. In cases with a small angle and without hyperphoria binocular vision was always preserved, but with a large angle or associated with a hyperphoria in early life it was deficient.

In treatment, she held that glasses were of little use except in cases associated with myopia. Orthoptic exercises were useful in coöperating patients. Cases of divergence excess and small-angle squints were the most suitable for training. This was in three stages: breaking down of suppression and eliciting diplopia; improving fusion and giving amplitude; and correlating accommodation and convergence so that the patient could get binocular vision for every distance.

Dr. W. H. SUMMERSKILL (London) read a paper on the restoration of the visual and fusion functions of

The Amblyopic Eye

He described amblyopia as a functional block to perception and he thought there were two varieties, a passive type, the result of incomplete facilitation of the visual arc, and a purposive type, in which there was deliberate suppression. He emphasised the psychological aspect of amblyopia and advocated therapeutic suggestion with the patient in the hypnoidal state. In addition, orthoptic treatment was carried out. Of 34 cases which he had treated, 19 had obtained 6/6 or 6/5 vision.

Sir JAMES BARRETT (Melbourne) said that congenital amblyopia was extremely rare and that such an eye had never been examined histologically.

Prof. W. BURRIDGE (Lucknow) read a paper on some

Fundamentals of Vision

with remarks on night-blindness. He said that it had so far been tacitly assumed that the electrical stimulation of isolated muscle or nerve was a natural stimulation. As a result all classical explanations of the phenomena of retinal stimulation included the assumptions that the end-organ had inherent quiescence until excited to activity, and that its stimulation was a process akin to the excitation of muscle or nerve by electric currents. It was found, however, that natural stimulation could also be

exactly investigated in the heart by varying the concentration of drugs in a perfusing solution. This revealed the fact that this process was entirely different from that investigated in isolated muscle by means of electric currents. Hence either there were two types of natural stimulation or the process classically investigated as such was a laboratory artefact. The behaviour of stimulated retinal end-organs was the same as that of a beating heart stimulated by a drug. He therefore concluded that retinal end-organs had an inherent rhythmical activity which was augmented by light. He further argued that this primary hypothesis enabled one to deduce or predict the already known facts of colour vision and colour-blindness, the existence of after-images, the facts of scotopic and photopic vision, as well as the existence of night-blindness. Holding that the predictable mechanism of night-blindness was one which could be put into operation by many causes, he said that any claim to have found the real cause should therefore be regarded with suspicion.

Mr. J. GRAY CLEGG (Manchester) in a paper on the

Optic Foramen

drew attention to the newer knowledge of its anatomy as revealed by radiography. There were various physiological variations which affected the clinical course of a lesion of the optic nerve. A narrow foramen was an obvious factor when inflammatory exudates occurred. He cited a number of cases, illustrated by lantern slides.

Mr. ARNOLD SORSBY (London) in a paper on the

Ætiology of Myopia

reviewed the factors entering into the total refraction of the eye and stressed the fact that a great range of refractive errors could be obtained theoretically from the combination of refractive media, each of which separately would fall within normal limits. It was therefore clear that the various refractive components of the eye were not free variables but were somehow correlated; otherwise high refractive errors would be the rule and not the exception. The problem of correlation was therefore a fundamental one and affected not only the question of myopia but that of refractive errors in general. It represented an almost complete blank in our knowledge of ocular physiology. He drew attention to the curve of distribution of refractive errors and showed that the elongation of the myopic limb of such a curve supported the views of those who believed there was a physiological myopia as well as a pathological variety. Recalling the work of Tron, he said that there was no evidence that lower degrees of myopia were due to axial elongation. The problem of myopia was not therefore to find the causes which produce axial elongation, but to determine what exactly was the underlying optical condition in myopia. It could certainly be taken as proved that the various extraneous factors that had been held responsible for the production of myopia had no basis on fact. His own work on the excess of myopia in Jews illustrated the same point.

Sir JAMES BARRETT drew attention to the difference in the refractive state of domesticated animals as compared with the wild species.

In a paper on

Intracapsular Extraction

Mr. H. H. MCNABB (Manchester) gave the results of a modified Sinclair operation in 150 cases performed at the Royal Eye Hospital, Manchester. He did not make the corneal section till 20 minutes after the retro-ocular injection. The softening of the globe thus obtained lessened the risk of loss of vitreous and of dislocation of the vitreous after extraction. Instead of a lid retractor he used two sutures in the skin near the margin of the upper lid, the lower lid being held apart by a single suture. The lens capsule was grasped by a special pair of forceps with splayed ends, which pushed down the rim of the iris and prevented its being caught by the forceps. Some vitreous was lost in 6 cases, resulting in a lost eye in one, but in 6/6 vision in the others. Hyphæma and striate keratitis were fairly frequent but always cleared. The visual results were as follows:—

	Per cent.
6/6 or better	104 (69·3)
6/9–6/12	21 (14·0)
6/18 due to disease of eyes	21 (14·0)
6/18 without apparent disease of eyes ..	3 (2·0)
Lost eye	1 (0·7)

Lieut.-Colonel E. O. G. KIRWAN (Calcutta) said that he employed the intracapsular method in 50 per cent. of his cases. The Smith method was good for Morgagnian cataract and for cataract in old people. The Barraquer operation required extreme care. The safest method was removal with forceps.

SECTION OF NEUROLOGY AND PSYCHOLOGICAL MEDICINE

AT a session of this section, with Dr. WILLIAM BROWN (Oxford), vice-president, in the chair, a discussion on

Amnesia

was opened by Dr. R. D. GILLESPIE (London). "Remembering," he said, in the sense in which he used the word, was an activity of the highest level of the organism—that is, the ego. In its fully evolved form it included registration, retention, recall, time-ordering, association, feeling of partness, continuation of personal identity, and emotion of belief. Amnesia might thus reflect failure at one of several levels. Assuming that registration and retention were normal, an inhibition of remembering—in other words, amnesia—must be due mainly to an inhibition of recall. Recall might be side-tracked for physiological reasons, or it might be apparently blocked, as in epileptic dementia; but the commonest mode of inhibition was certainly psychological, by the process known as repression. Freud said that all symptoms depended upon repression, and repression always produced an amnesia for something. Dr. Gillespie suggested, however, that all amnesias were not due to simple fading or active forgetting—i.e., repression. There were other possible explanations. For example, the imaginative reconstructions, or "schemata," of early childhood and infant years were different from those of a later age: a breast, for instance, was not remembered as such, but merely as a large globular object with perhaps the idea of softness and satisfaction associated. Translation into newer schemata would not occur unless there were some biological need for it. Emotional events were intrinsically difficult to recall: it was impossible to recollect an emotion in tranquillity. Repression was not a voluntary act but essentially involuntary, and amnesia from repression might depend on the automatic operation of the super-ego, the operation of the ego itself, or the conflict of wishes. This last was the commonest everyday type. In the forgetting of an appointment, for instance, a kind of reciprocal inhibition was in action, usually leading to the victory of the wish which was more in accord with the egotistical interests.

Clinical types of amnesia might be differentiated on a descriptive basis, as (*a*) fragmentary, as in the amnesia of progressive brain disease, where bits of past experience were forgotten long before the anterograde amnesia became generalised ; (*b*) localised or insular ; and (*c*) total. All of these could be either retrograde or anterograde. The insular and total were of chief clinical interest both in differential diagnosis and for medico-legal reasons. The causes might be : psychological (including affective, hysterical, and simulated), and physiological (organic), including traumatic, epileptic, toxic, tissue-degenerative, and circulatory. It was extremely difficult to differentiate simulated amnesia from hysterical. From the symptomatic standpoint these two were identical, but the reasons for them were vastly different. In hysteria the patient simulated from inner needs, but he did not know why, except that he might realise that he wanted sympathy. In real simulation the patient did it to evade crude external difficulties of which he was constantly aware. The grosser symptomatic manifestations of hysteria might be the joint production of the patient and the too credulous physician. He would regard as almost certainly malingering an amnesia arising without physical cause in a person who was up against a known material difficulty, such as an accusation of theft. An amnesia was likely to be psychogenic rather than organic if it was associated with complete intellectual capacity from the time when it came under observation, if it was arbitrarily selected, inconvenient events being forgotten, if recovery was sudden and complete, or if recovery took the form of a gradual rolling-up of the amnesia, in orderly fashion. Ritchie Russell had said that seven days was the longest period for retrograde amnesia due to a physical cause, such as trauma ; an amnesia of sudden onset which lasted longer was probably psychogenic.

In medico-legal cases it was important to differentiate amnesia : it might occur because it was convenient to forget the crime or because the incident forgotten had an intense emotional content, in which case malingering was not the cause. Where there had been a fugue dictated by emotional stress, followed by amnesia, the amnesia often developed after the fugue, and not at the beginning of it. For example, a patient who ran away from home because of some difficulty, hoping to find some escape, might realise that this did not provide a solution and might develop amnesia either for the period of the fugue alone or for the whole of his previous life. On the other hand, a case was on record of a boxer who had won a fight after a heavy blow which caused a complete amnesia for the rest of the contest. Post-epileptic amnesia might extend back to long before the onset of the attack.

Dr. D. C. CARROLL (London) pointed out that the mind seemed able to form memory-traces of all experiences of importance to the psyche. To the psycho-analyst the problem of amnesia was the problem why all these memories were not accessible to consciousness at will. The explanation lay partly in the involuntary repression of painful experiences : consequently if there were many primary conflicts in early childhood there would be many possibilities for the forgetting of associated experiences and ideas later in life. The three chief causative factors in amnesia not of organic origin were : (1) a constitutional factor involving memory-capacity and strength of instinct ; (2) conflict in infancy or early childhood, followed by repression ; and (3) a current stimulus. Radical cure could be achieved only by resolution of conflicts and liberation of repressions. Deep analysis was the only means of such cure but was too lengthy to employ in all cases. Superficial analysis was of little use where the primary repressions were the chief factor, and persuasion was of comparatively little value. But hypnosis and suggestion, especially the former, were valuable in all massive amnesias and hysterical amnesias. The greater the rôle of the current stimulus in producing the amnesia, the more was the condition amenable to treatment by suggestion. In hysteria there was a very rapid transfer of affect to the physician, with quite distinctive signs of anxiety ; and in the absence of these signs it would be safe to say that the case was not one of conversion hysteria. This was a valuable criterion in distinguishing the true hysteric from the malingerer.

Dr. F. R. FERGUSON (Manchester) said that in the differential diagnosis of difficult cases the following factors were in favour of a traumatic origin : a normal psychological history ; no family history of mental abnormality ; no previous history of faints or amnesia ; a severe head injury ; some abnormal physical signs on examination ; normal behaviour before and after the accident ; a retrograde amnesia of not longer than 36 hours and a total amnesia of not longer than 10 days.

The PRESIDENT (Dr. T. S. Good) said that during the late war hypnosis had proved very valuable, but in civil life objections were raised, and he preferred the analytic approach.—Dr. T. A. ROSS (London) thought that a warning should be given of the dangers of hypnosis in cases where there was amnesia with deep psychogenic factors. The amnesia betokened a grave mental condition, and might be the alternative to suicide. Also he questioned whether the material elicited under hypnosis was necessarily true. It exposed phantasy as well as past memories.—Dr. C. W. SOMERVILLE (Midlothian) said that the largest class of amnesias were the post-traumatic. Usually amnesia was present in regard to the blow, or injury, and there was no confusion about previous events—i.e., the anterior memory was as good as if there had been no accident.

Dr. TOM WILLIAMS (Philadelphia) cited cases from Marie's investigations in which memory was retained for recent events and lost for earlier experiences. Loss of native language had occurred with persistence of memory of a foreign language.—Prof. FOSTER KENNEDY spoke of a man who lost his memory for 17 years of his life.—Dr. J. L. DELICATI (Bath) referred to the experiences of Mr. A. C. Benson, the novelist, after a concussion.—Sir HUBERT BOND (London) described his own amnesia after a blow on the head from a patient. He remembered the blow but had an amnesic period covering some hours after it.—Dr. DORIS ODLUM (London) agreed with Dr. Ross that it was dangerous to interfere too lightly with an amnesia. Amnesia of psychogenic origin was protective, and she knew of cases in which too sudden recovery had led to suicide or to acute confusional insanity. Similarly the liberation of emotional material by analysis should not be too sudden or too massive.—Dr. DAVID BLAIR (Edinburgh) recalled the case of a man found in a confused state on an upturned boat in the Mersey. The patient recovered from the confusion but remained completely amnesic as to his past life for twenty years, and ultimately died of a stroke. Dr. Blair strongly agreed about the protective character of psychogenic amnesia.—Dr. J. R. BENSON (Salisbury), also agreeing, quoted Matthew Arnold : "We forget because we must, and not because we will."—Dr. W. W. MURPHY (Inch, County Wexford) described

his amnesia after a fall from his horse, and spoke of the case of a farmer who had lost his memory for twenty years dating from his eviction from his farm.—Dr. HILDA HURFORD (Reading), referring to the protective nature of amnesia, said one must go step by step with the patient in an analysis, so that he or she might assimilate the liberated emotional material.

The CHAIRMAN (Dr. Brown) mentioned a case in which hypnotic treatment dispelled the amnesia but induced a state bordering on melancholia, with a possibility of suicide. The melancholic reaction proved that the condition was a true amnesia, and recovery was eventually satisfactory.

Neuroses and Psychoses

Prof. FOSTER KENNEDY (New York), in a paper on the organic background of neuroses and psychoses, said that neurology and psychology must be pervaded by and must pervade all medicine. Search must be made for the toxic or chemical or glandular origins of disease, the basis on which one day the real pathology of mind would be established. Various diseases now accepted as organic had been thought to have no organic or structural basis, such as general paresis, paralysis agitans, and asthma. Surely the time had come to put away the notion that deviations of mental and emotional nature were disease-units in themselves; or that psychiatry dealt just with mind disease. Mind was to the brain and body as the function of sight was to the eyes. It was necessary to learn what was the play of organic forces that would make one person stable and another unstable. Freud had made it clear that in their emotions, in their strivings, in the preponderance of this instinct over that, at different periods in their lives, human beings recapitulated the evolution of their race. This was a real contribution to knowledge, but it was a mistake for medicine to limit itself to any pontifical doctrine. Even inherited endowment was not a fixed concept. Inheritance of acquired characteristics certainly occurred, and the pressure of sex, the pressure of hunger, and the pressure of the herd moulded and modified the growing organism.

Myotonia Congenita

Prof. KENNEDY then showed a film of a case of myotonia congenita treated with quinine dihydrochloride. The dosage was from 5 to 7 grains twice daily by mouth given in a capsule. The stiffness of the muscles disappeared immediately after ingestion of the drug, and the maximum effect was established within a few minutes. Twelve cases had already been treated with complete success. It was, however, necessary to continue giving the drug indefinitely, since it appeared to supply something that was lacking to the motor end-plates of muscles. The method was therefore a form of substitution therapy. The quinine was the complete antagonist of Prostigmin. By analogy it should be successful in treating myotonia atrophica, but he had not actually tried it in this disease.

SECTION OF SURGERY

AT an afternoon session of this section Dr. W. E. GYE gave a demonstration of the

Relationship of Viruses to Malignant New Growths

The tumours in which viruses have been demonstrated, he said, are: (1) tumours in fowls, (2) a papilloma of the cottontail rabbit of Western America, and (3) an adenocarcinoma of the leopard frog of America. In these tumours in which a virus has been proved to play a causative part, the disease is not contagious; animals bearing "virus-tumours" can be kept with normal animals and contagion never occurs. In this respect and also in respect of curability by excision in the early stage of the disease there is no difference between virus tumours and tumours in which a virus has not been demonstrated. Cancer is essentially a local and not a general disease. Even late recurrences, years after removal of a primary growth, are true to type, as they would not be if cancer were a general disease of the body. A papilloma occurring in the rabbit contained a virus, which, by scarification into the skin of other rabbits, reproduced the papilloma. In the domestic rabbit this papilloma always became malignant, and from the malignant tumour no virus could be obtained. Again, there was a papilloma produced by local irritation with tar which could be made to flare up into a carcinomatous growth by intravenous injection of papilloma virus. It was interesting that not only the actual papilloma but the whole area irritated became carcinomatous. Dr. Gye demonstrated diagrammatically the relative sizes of bacteria of the known viruses and of the largest chemical molecule. He showed that vaccinia and psittacosis viruses were the largest, the viruses of foot-and-mouth disease and poliomyelitis the smallest, whilst the viruses of tumours occupy an intermediate position. Actual specimens of tumours due to viruses were shown.

FAMILY LIMITATION IN THE UNITED STATES

IN 1933 and 1934 Prof. Raymond Pearl published preliminary accounts of a comprehensive investigation into human fertility and the factors that influence it, with particular reference to contraception. He has now issued a third progress report dealing briefly with the complete material derived from 30,949 women resident in 15 of the United States (Milbank Memorial Fund Quart., July, 1936, p. 2). In general respects these women appear to be fairly representative of the population in the same areas. Of the white women 42·7 per cent. had practised contraception before the time of record, of the Negro women only 16·4 per cent. The percentage of white women probably under-estimates the corresponding figure for the general population of women, and Pearl concludes that the actual proportion practising contraception in the latter is likely to be of the order of 55 to 60 per cent. This is rather a low figure compared with some that have been put forward—for example, from birth control clinics; but women attending such clinics are not a representative sample of all women, and the percentage based upon them probably errs on the high side. The success attending the efforts of the "contraceptors" is not very remarkable, for Pearl's deduction from his figures is that "the diligent contraception of these women, except in the 15–19 age-period, yielded only a meagre 20 to 30 per cent. dividend in the way of surcease from the troublesome consequences of coition instead of the intended 100 per cent." White women who intermitted their practice of contraception for the purpose of producing children deliberately at a particular time appeared more successful in keeping down their pregnancy rates early in life, but only by small amounts at later ages. It is possible that the earlier success is an indication of the general higher level of intelligence of this group, while its absence at later ages may be accounted for, Pearl suggests, by the fact that their desire for children was not materially different from their inherent physiological ability to produce them at those ages.

A complete account of this material is promised in book form next year, and will include a digest of the extensive literature regarding fertility and the biology of human reproduction.

REVIEWS AND NOTICES OF BOOKS

Child Psychiatry

By LEO KANNER, M.D., Associate Professor of Psychiatry, Johns Hopkins University, Baltimore. London: Baillière, Tindall and Cox. Pp. 527. 27*s*.

THE appearance of its first good text-book is a great occasion in the life of any newish branch of medicine: for child psychiatry the event is exceptionally happy, since there has been loose thought, misunderstanding, and wordy ignorance among both its detractors and its professors—errors which a systematic, sensible, and learned text-book can do much to dispel. Dr. Kanner's book is admirable. It expresses a general outlook, coherent and well informed, which is derived from the teaching of Adolf Meyer; at the same time details and obscurities are not slurred over with vague phrases, but fairly stated and illustrated by clinical instances. The author is widely read and gives full references, a merit in this text-book not always to be discovered in its elder sisters dealing with adult psychiatry.

As is emphasised in the forewords of Prof. Park and Prof. Meyer Dr. Kanner has had a wide experience with children at Johns Hopkins Hospital, and his work is free from far-fetched theorising or specious promises. The basic principles of the subject and methods of examination and diagnosis are first expounded, factors such as age, sex, physical condition, intelligence, emotion, constitution, and environment being given separate consideration. General principles of treatment conclude the first part of the book. Those difficulties of personality which are essential features or sequels of physical illness are next examined, followed by eight chapters on the intermediate disorders which express themselves as disturbances of some partial function, whether it be digestive, circulatory, nervous, urinary, vascular, or in the field of the special senses. The remaining half of the book deals with the disorders of total behaviour, what the author calls "personality difficulties expressing themselves clearly as whole-dysfunctions of the individual." The division of the material may be recognised from the successive chapter headings: emotional disorders, thinking difficulties, disorders of speech, habitual manipulations of the body, faulty feeding habits, sleep disturbances, antisocial trends, sexual difficulties, attack disorders, minor psychoses, major psychoses, and suicide in children.

A Textbook of Midwifery in the Tropics

Second edition. By V. B. GREEN-ARMYTAGE, M.D. Brist., F.R.C.P. Lond., F.C.O.G., Capt. I.M.S. (retired), Gynæcological Surgeon to the West London Hospital; Obstetric Surgeon to the Jewish Maternity Hospital, London; and P. C. DUTTA, M.B. Calcutta, F.R.C.S. Edin., I.M.S. Civil Surgeon. London: Butterworth and Co. (India), Ltd. 1936. Pp. 447. 12*s*.

Dr. Green-Armytage and his collaborator, in the second edition of their book, have rewritten many sections, and allotted extra space to antenatal and postnatal care. The subject matter is presented in the form of a synopsis, which is likely to help those to whom English is a foreign language. There is but one criticism to offer so far as the British presentation is concerned: the conditional tense is avoided at certain places where its use is indicated. The book contains much information new to those who work in Western parts, such as the high incidence in the tropics of hydramnios and hydatidiform mole and the low reserve kidney. One reads that the condition of "pregnancy kidney" affects the large proportion of 15 per cent. of pregnant women in Bengal. Other interesting points are the special danger of toxic vomiting in tropical countries, and the fact that 23 per cent. of women suffer from painless bleeding at the time of the periods for the first three months of pregnancy. As would be expected, from the prevailing conditions, it is taught that over 60 per cent. of Indian women have prolapse of various degrees. Pyelitis is particularly common, and is connected with the presence of intestinal parasites.

The anæmias of pregnancy are treated more fully than in the previous edition. The chapter on diseases associated with pregnancy is a mixture of pure tropical medicine and diseases which are common in the tropics. It is to be regretted that none of the excellent diagrams scattered through other parts of the book find a place in the section on normal labour, where they would be of great help to the Indian student attempting to follow a list of the sequence of movements. The chapter on contracted pelvis is clear and concise; the methods used to determine disparity between the head and the pelvis are well explained and illustrated. It may be hoped that the substance of this chapter, and information given elsewhere in this book, will not induce any Indian obstetricians, who may be surgically minded, to dispense with trial labour and substitute the lower segment operation as the easier way out of a difficulty. It appears that test labour and induction are apt to be disappointing in tropical countries.

About half the cases of puerperal infection, it is here stated, are due to tropical diseases, and the method of dealing with cases of this nature is indicated. At the end of the book there is a short chapter on the uses of X rays and one on blood transfusion. An appendix describes in a pictorial way the exercises which have been found to be an important part of postnatal care in the tropics.

Appendicitis, When and How to Operate

By W. J. STEWART MCKAY, M.B., M.Ch., B.Sc., Senior Surgeon, Lewisham Hospital, Sydney. Sydney: Angus & Robertson. 1936. Pp. 254. 12*s*. 6*d*.

THIS book has been written to assist the country practitioner to deal with cases of appendicitis. Its perusal is likely to engender in the reader an attitude which assumes that any patient, suffering from abdominal pain, is more than likely to have appendicitis and which will enable him to educe almost any symptoms as corroborative evidence of this hypothesis. It is difficult to believe in these days that either surgeons or their methods, even in the Australian bush, are as primitive as the author would lead us to believe. There is no more essential information in the book than can be found in any standard text-book of surgery, though there are hints as to policy and demeanour towards the patient and his friends. Evidently the author is a man of much experience and has had to work under very bad conditions in the past; he does not give one the impression of having made a very profound study of appendicitis. He gives minute instructions as to the use of kitchen tables as operating tables and the laundering of operative materials. But some of the main problems of appendicitis, for instance the obstruction which

occasionally occurs in the first week after operation, escape full discussion. The book is well printed and contains much interesting material.

Asthma, Hay Fever, Migraine

Their Nature and Treatment. With Other Clinical Studies. By A. G. AULD, M.D., M.R.C.P., Physician to the Westminster General Dispensary. London: H. K. Lewis & Co. Ltd. 1936. Pp. 257. 12*s.* 6*d.*

IN this volume Dr. Auld has collected the more important of his publications in the medical journals since 1888. The greater part of them deals with the treatment of asthma and other allergic conditions by injections of peptone, of which he is an enthusiastic advocate. It would appear that he finds "Witte's New Peptone 30" the most satisfactory for general use. It is given intramuscularly as a 7·5 per cent. solution in doses from 1 to 5 c.cm., or intravenously as a 5 per cent. solution beginning with 0·2 c.cm. and increasing gradually to a dose of 2–3 c.cm. In addition, the mixture of peptone with human serum is given and may be combined with intramuscular injections of bismuth. Case-histories are given indicating the value of peptone therapy in asthma, hay-fever, and migraine, and the nature of allergy is discussed with reference to the action of peptone as a non-specific desensitiser. Further chapters deal with pyrogenic therapy, oxygen-want, physical examination of the chest, bronchitis, pneumonia, fibroid phthisis, and nephritis which are more of historic than practical interest.

The reader may feel that the author could have given his conclusions on the value of peptone treatment in a more concise form instead of publishing his observations in chronological order, but the book will nevertheless be of interest to those dealing with the treatment of allergic disorders.

A Text-book of Physiology

Second edition. By H. E. ROAF, M.D. Toronto, D.Sc. Liverpool, M.R.C.S. Eng., Professor of Physiology in the University of Liverpool. London: Edward Arnold and Co. 1936. Pp. 697. 21*s.*

MODERN physiology insists on integration, and the body is seen more and more as a unit rather than a conglomeration of details. Thus authors can start with any system they please, so long as they make it simple enough to be understood by the beginner. Once the student has received his introduction, be it through "muscle," "reproduction," or "digestion," he is in a position to grasp further facts, and so on until he has completed the cycle. Physiological processes are so inseparably linked that any division into systems is arbitrary, and is at the best a necessary evil which has to be borne for the sake of teaching. Few writers would claim a "logical" order in which the systems should be taken. Prof. Roaf, however, is more convinced of the importance of logic than overwhelmed by the conception of integration, and he comes much nearer to killing the two birds with one stone than is usual with a more conventional treatment. The reason for this is that he chooses an approach, not necessarily more logical than any other, but appearing logical to the student and following lines with which his study of the preliminary sciences has made him familiar. Thus the physics of the body is taken first—the mechanics of movement, of the circulation, of respiration, electrical changes in the heart, and so forth. By the time the student has completed the next section, whose motif is the chemistry of organs and their processes, he has left untouched almost no system of the body, and has been asked to do little more than apply knowledge which he already possesses. Those who teach physiology will at once see that here is a possible alternative to those introductory lectures which pass rapidly over the whole field, and which teach the student nothing which he does not meet again in the later detailed account. The third section of the book deals with the regulating and integrative activities of the nervous and endocrine systems, and the fourth with the "maintenance of the individual and reproduction of the species." These may be regarded as the ultimate purposes of physiological activity, and the book ends well with this section. The reader has not only been led by easy stages from the less to the more advanced aspects of the subject, but has had an excellent demonstration of integration.

The amount of actual information that can be introduced into 700 pages does not vary greatly; possibly this book contains a little more than the average because of its economy of expression. Its distinctive features are the plan on which it is written and the rational presentation and grouping of facts in such a way that the subject appears reasonable to the student making its acquaintance for the first time. The author is emphatic in the preface that other books should be used, and this disarms criticism as far as omissions are concerned. In any case, there is little fault to find in this direction. The worst that can be said is that the book is rather heavily weighted on the physical and chemical as compared with the biological side, but this would be difficult to avoid in the method of treatment adopted and leads to a disciplined view of the subject which has its advantages.

Begabung im Lichte der Eugenik

By Dr. JOSEF SOMOGYI. Leipzig and Vienna: Franz Deuticke. 1936. Pp. 518. M.14.00.

THIS book, now translated into German from the Hungarian and revised, is an attempt at impartial survey of the problem of race and eugenics in all its aspects. It is however no more than an attempt—honest and learned but unsuccessful because of the nature of the questions raised and the material available. The author is a good man struggling with adversity: he wants to be fair and unbiased, but he has read and absorbed too much that comes from the Gobineau-Houston Stewart Chamberlain-H. F. K. Günther school of thought to be able to avoid false generalisations and axioms. In a casual reference which he makes to English racial psychology, for example, he says:—

"Though alike nordic, the Englishman is a practical man, the German a theorist. The Prussian is abrupt, the Englishman superior, the Swede reserved. The Englishman is full of pretensions, the German rather unassuming and modest in his demands. Travelling abroad, you find the nordic Englishman almost entirely in the grandest hotels, while the racially kindred German can feel perfectly happy in the simplest inns, places that an Englishman would never put up at a second time, he would sooner forgo his journey."

Much of the book is on a better factual level than this, but the author cannot overcome prejudices, without which many of the problems considered would lose any scientific meaning they seem to have.

The biological and psychological parts of Dr. Somogyi's book are the most satisfactory, the political and social least so; the book as a whole is an example of the meagreness of our knowledge concerning the hereditary transmission of mental qualities.

THE LANCET

LONDON: SATURDAY, SEPTEMBER 19, 1936

MOYNIHAN AS A CRAFTSMAN

IT would be difficult to overestimate the influence MOYNIHAN had on English surgical craftsmanship. It was not that he originated new details in technique, though he was insistent on the great importance of attention to detail; or that he invented surgical instruments, though there are many with which his name is associated. His effect was above all a psychological one. He brought about a general alteration in the intellectual attitude to operations. Perhaps it is more true to say that his forceful personality drove out into the open the faith of the many conscientious surgeons whose natural reserve prevented open confession. He regarded every operation almost as a religious rite; as he expressed it, a sacrament. He felt with great intensity the magnitude of the surrender of a man's whole future, and indeed very often of his life, to the judgment and manual skill of a perhaps hitherto unknown surgeon. That was the gospel he preached and on these foundations was raised the magnificent edifice of his surgical technique. By his personality not only did he infuse a like spirit into the surgeons and accessory staff with whom he was associated, but he was able to communicate it to visiting and other surgeons who carried it to their own centres of work. In countless operating theatres procedure has been based on the example at Leeds.

MOYNIHAN'S operating had all the certainty and ease of a master craftsman perfected by long experience, but he perceived that his supreme manual skill was only a part of the operation. In every detail there must be the same high standard of achievement. So with his logical mind he searched the world for what was the best, the most simple, the most effective, and integrated them into a magnificent routine. In no stage of the operation was anything which could be humanly directed left to chance. What might be considered affectations in a lesser man—the green towels to rest the eyes, the red towels for infected instruments—were part of the minute attention to details which he claimed were the secret of his success, though it was evident to all that this success was due to his logical analysis of essentials, his unswerving integrity of purpose, and his unwavering loyalty to his beliefs. His needles must be perfectly adapted for their work, his intestinal clamps must be of just the right elasticity in the blades, the very clips which fixed the swathing cloths to the wound edges must be the most convenient. So patterns of these and many other instruments were devised and to them his name is attached. It is no exaggeration to say that MOYNIHAN directly led to the reorganisation of nearly every operating theatre in the country. His other great contribution to the craftsmanship of surgery was similarly of an intellectual nature. He insisted that a surgeon must think in terms of function as well as in terms of structure. He it was who emphasised the profound physiological changes brought about in the economy of the body by operations which were too often regarded solely from a mechanical standpoint. It is this altered attitude of mind that has stimulated so much of the experimental and physiological investigations of recent years. He urged the inquiry into physiological function before deciding on an operation and claimed a great reduction in mortality by this means in his own practice.

The young surgeon of to-day is trained in an atmosphere very different from that which held sway thirty years ago—immeasurably more rational, more embracing, more scientific—and this change has been due very largely to the vision and personality of one man. MOYNIHAN will be remembered as a master whose hand was destined to leave its imprint upon English surgery.

EFFECTIVE DENTAL SERVICES

DISCUSSION at the Southport congress of the Royal Sanitary Institute focused the attention of public health administrators on one of the most pressing problems of the time. Good health depends on good teeth in ways of which our forefathers had no conception; the misery of toothache, which drove De Quincey to opium, is now known to be but a minor manifestation of the damage that can be brought about by dental disease. With this advance in knowledge has come a remarkable development in dental technique, so that the modern dentist, working to a tiny fraction of a millimetre, can perform what would once have been regarded as miracles. But the people who make adequate use of dentistry are only a very small proportion of the population. From the reports of school medical officers, from Army recruiting statistics and other sources there is abundant evidence of a vast prevalence of dental disease which fully justifies the resolution passed at the Southport congress in favour of an extended public provision of dental services. Some provision is already being made. Maternity and child welfare services include dental supervision and treatment, though at present on a small and very inadequate scale; school dentistry is being developed; and the dental benefit of the national health insurance scheme is providing dental treatment for a substantial number of persons who otherwise would be unable to obtain it. But these are only beginnings. A great expansion of dental provision is needed, and there is need also for bringing together in a coördinated system what are now discontinuous and unrelated services. There are of course serious obstacles in the way of expansion on a large scale. Apart from the question of cost, which in itself is formidable, there is the further difficulty that dental disease is so prevalent that there are not enough dentists in the country to deal adequately with it. But the initiation, with the coöperation of the dental

profession, of a forward movement to provide dental services on a national scale would do much to overcome this difficulty. It would tend effectively to remove the unattractiveness of the dental profession to which Mr. H. BROUGHTON referred in his recent presidential address to the Public Dental Service Association and bring more recruits of the right kind into the profession.

Immediate advance over the whole field being impracticable it is worth while to consider in what directions energy and money may most profitably be expended. It would surely be best to begin at the beginning, by making dental care an essential part of welfare work. For the expectant mother, the nursing mother, and the pre-school child there is great need for dental services, both preventive and curative. Many local authorities and voluntary associations provide dental care in connexion with maternity and child welfare centres, but the provision so far made only touches the fringe of the need. Much more should be done not only to provide dental services but to induce parents to make adequate use of them. Here is a promising field for the trained persuasive powers of the health visitor; and it is a field in which more than in any other public support may now be expected. Increased provision of dentistry for mother and child would facilitate a similar development of school dental services. Dr. A. C. TIBBITS, in moving the resolution at the Southport congress, pointed out that in 1934 only 63 per cent. of the school-children needing dental treatment got it, and this in many cases is due to lack of parental appreciation of the importance of dental care. Educational work among mothers (not forgetting indirect suasion through fathers' councils) during the periods of pregnancy, suckling, and pre-school childhood would do much to promote dental hygiene and care during school life, and would facilitate the successful operation of such extensions of school dentistry as the orthodontic work described by Dr. ELWIN NASH in the August issue of *Public Health*. These developments might usefully be coördinated with the dental work, small at present but increasing in volume, undertaken by local authorities in connexion with the duties devolving upon them under the Local Government Act, 1929. The L.C.C. has recently recognised its extended responsibilities for dental treatment by appointing a full-time dental consultant to assist its principal medical officer. The outcome of this appointment is awaited with interest.

Entirely separate from the services so far considered, and, it may be added, almost uncoördinated with medical benefit, is the provision of dental treatment under the national health insurance scheme. The public money spent each year on dental benefit amounts to nearly £2,000,000, in addition to what is almost an equal amount paid by the patients as their quota, and there is a growing doubt whether the money is spent to the best advantage. The sum expended is considerably less than the sum available; a substantial proportion of the dental letters issued are not used by the patients, and there is no disposition to question the statement made in the annual report of the chief medical officer of the Ministry of Health for 1933 that "the number of cases in which the treatment falls short of a reasonably satisfactory standard is still far too high." It may well be doubted whether the approved societies, constituted primarily to pay cash benefits, are the right kind of local bodies to administer a health service, and whether the arrangements for the engagement and remuneration of the dentists are calculated to secure a high standard of professional work. In dental benefit the principle of free choice is pushed to the utmost limit. There is no panel of dentists; the patient can take his dental letter to any dentist he chooses. The patient pays part of the cost of treatment, except in cases in which it does not exceed 10*s*., and this arrangement offers opportunities for various forms of "contracting out" which are difficult to detect or prevent, while the kind of supervision that the regional dental officers are in a position to exercise can hardly be expected to give the best results. The provision of dental services as a statutory health insurance benefit was considered ten years ago by the Royal Commission on National Health Insurance, but was not recommended largely because of the high cost it would entail. Cost is still an important matter. Money should be spent where it will produce the maximum return, and unless a searching inquiry furnishes proof to the contrary it will continue to be held that it is not by further expenditure on insurance dentistry that maximum returns will be secured.

Some would urge that it is in the field of research that the fullest returns are to be obtained. Why does dental disease exist? Is it entirely or mainly a matter of nutrition, or are there other important factors at work, and, if so, what factors and what is their relative importance? To these questions different answers would be given by authorities whose opinions are entitled to a respectful hearing. But whatever else may be doubtful there will, we think, be general agreement that no scheme of national dental services would be satisfactory that did not include adequate provision for increasing the stock of knowledge of the causes and prevention of dental disease.

THE INJECTION TREATMENT OF HERNIA

THE injection treatment of varicose veins was hailed not only because of its convenience, but also because poor results had been obtained from surgery. The injection treatment of hæmorrhoids, on the other hand, did not replace a bad surgical operation; it was an operation much dreaded by patients because of its reputation for causing discomfort. The injection treatment of hernia, which has been attracting attention in America, comes into rather a different category. The common surgical operations for both inguinal and femoral hernia are scientifically planned, and in experienced hands give excellent results; there are too weighty theoretical objections to inducing inflammation at the site of a hernia. Against

this must be set the fact that the hernia patient is unwelcome in hospitals: he occupies a bed that is only grudgingly made available since the other claims on it seem more urgent. Moreover, the operation for hernia is regarded in some hospitals as the perquisite of the beginner in surgery, and as a result complications and recurrences are not unknown. Yet even from the standpoint of convenience the advantages are not all on one side; for to surgeon and patient alike the repetition of injections over a long period may well prove tedious. HARRIS and WHITE,[1] reviewing the results in 100 cases, say that the number of injections varies from as few as seven in a young adult with a good reaction to as many as thirty-four in an elderly patient with a large hernia. Even with injections repeated on alternate days, which is the usual procedure, it is evident that the course must last a considerable time. The use of a truss, which is compulsory during the period of treatment and for several weeks or months afterwards, is another drawback. The care with which it must be fitted and the fact that it must be worn day and night for at least three or four weeks, have to be weighed against the loss of time and the annoyances associated with a formal operation.

HARRIS and WHITE report almost uniform success in their own series; but they hold that injection treatment should not be undertaken without a very complete surgical knowledge of the inguinal region, and that care is necessary in the selection of a suitable substance for injection. This latter point is particularly emphasised by WINTERS of Chicago.[2] Gross inflammation by strong chemical irritants is not an aim of the modern treatment. Slough formation is a definite danger where there is much reaction, and it may even be followed by absorption of the resulting scar. The basis of most solutions now used is tannic acid, employed in a solution so weak that it leads to no severe chemical irritation. Sodium psylliate is also used. HARRIS and WHITE have found the commercial preparations Pina-mestre solution and Proliferol suitable in that they fulfil their three requirements of being non-toxic, causing no peritoneal inflammation if introduced accidentally into the peritoneal cavity, and giving a satisfactory fibroblastic response when injected into living muscle. WINTERS uses colloidal potassium guaiacol sulphonate, which has the advantage of being sufficiently painless in injection as not to require preliminary infiltration of the area with novocain. There seem to be two views as to the best technique of injection. WINTERS starts around the internal ring and works downwards to the external ring. HARRIS and WHITE argue with some force that this involves some danger of incarceration, while, by beginning at the external ring and working gradually upwards, the sac contents are forced back by the resulting exudate into the peritoneal cavity. Injection into the peritoneal cavity occurred three times in the course of about a thousand injections. The pain produced was severe, but it subsided in 10–20 minutes and the accident apparently did no other harm. Success has followed treatment of cases of direct hernia and of recurrences after operation. It seems likely that if the method becomes more widely adopted it is in these two types of case that its popularity will be most assured. At present, apart from a certain enthusiasm for the treatment in the United States, its exponents have remained more or less solitary in the various countries where it has been tried.

In the umbilical hernia of infants injection seems to have a definite use, hastening the cure of a condition that is apt to worry the parents out of proportion to its seriousness. The principle here is somewhat different from that involved in the injection of inguinal hernia. The object is to obliterate the sac by serous inflammation; whereas in inguinal hernia it is to obliterate the patency of the inguinal canal by intimate adherence between its muscle layers.

[1] Surg., Obst., and Gyn., August, 1936, p. 201.
[2] Med. Record, August 5th, 1936, p. 114.

FAHRENHEIT

Two hundred years ago on Tuesday last the German instrument maker, Daniel Gabriel Fahrenheit, died in Amsterdam at the age of 50. Fahrenheit was not himself a trained scientist, although he wished to be and would have been except for the early death of his father, a merchant in Danzig. But he had great qualities as a designer of instruments, and although he was not the first to use quicksilver for thermometers it was he who brought the mercurial thermometer into general use, and for this he was elected F.R.S. The use of mercury enabled the boiling point of water to be used as one of the fixed points of a thermometric scale. Alcohol had till then served as the expansile fluid for thermometers, although a bubble of mercury had sometimes been employed to make the spirit column easier to read. But the divisions on the scale had been arbitrary, based on such inexact data as the temperature of the air in winter and summer, or the melting point of butter. Fahrenheit consistently used as his lower fixed point the coldest thing he knew, which was a mixture of snow, salt, and sal ammoniac, and for a time his highest fixed point was the heat of the human body which he marked 24, the freezing point of water occurring at 8 divisions on the scale. With the mercury thermometer the boiling point of water was 53 on this scale, and on the advice, it seems, of Boerhaave Fahrenheit multiplied each of these divisions by 4 when the freezing and boiling points received their now familiar values of 32 and 212 degrees. The convenience of having an exact scale however illogically based was so great that when a year or two later Celsius proposed to divide the space between freezing and boiling points into 100 parts it was already too late to secure general assent, and to this day the same stretch of thermometer tube is divided in Western Europe into 180 parts, in Central Europe into 100 parts, and in Eastern Europe into 80 parts. Without detracting in any way from the value of Fahrenheit's achievement we may well ask how long this incubus is still to weigh on us. *Nature* last week took the pessimistic view that the Fahrenheit thermometer seems likely to remain in use for many years yet. The director of the Deutsches Museum in Munich remarks that even to-day in England and America temperature is measured according to Fahrenheit degrees in everyday life. We may trust that scientific medicine everywhere will soon go centigrade.

ANNOTATIONS

NEW INSULINS

ON August 22nd we published a paper in which Dr. Izod Bennett and Dr. A. M. Gill confirmed work recorded in other countries [1] showing that protamine insulinate acts more slowly than insulin and apparently maintains the blood-sugar in severe diabetes at an approximately normal level over long periods. Freund and Adler,[2] of Detroit, now report similar and perhaps even better results with another new product, which they term "crystalline insulin." Comparing the effects of this substance with those of ordinary insulin and protamine insulin they find that it diminishes the fluctuations in the blood-sugar level and decreases the severity and frequency of hypoglycæmic reactions such as are commonly seen with ordinary insulin. In this way its action is similar to that of protamine insulinate, but the onset of this action is said to be more rapid and its duration shorter—which may or may not be an advantage. It is to be noted that Freund and Adler give no clue to the constitution of the substance they employ, beyond that it is an "improved" insulin compound submitted to them for clinical investigation, and that it is a crystalline extract prepared from the pancreas. They claim that, unlike protamine insulin, it does not deteriorate with keeping, and that it can be used without any manipulation on the part of the patient such as is necessary with the Danish product.

Izod Bennett and Gill commented on the probable future appearance of various new insulin products and the difficulty that would arise in assessing their strength. This difficulty may well prove to be formidable, for with these new products, whose activity is essentially different from that of ordinary insulin, it is open to individual manufacturers to place on the market substances that will be hard to standardise and control. Though these seem likely to bring definite advantages to diabetic patients, their potential dangers must not be overlooked. In particular it should be noted that in the treatment of diabetic coma ordinary insulin is preferable.

ALCOHOL AND SPORING ORGANISMS

IN a paper on the preparation and testing of surgical catgut, based on work done at the Walter and Eliza Hall Institute, Melbourne, Dr. F. Eleanor Williams remarks [3] that alcohol must be regarded as normally neither sterile nor bactericidal to sporing organisms. Twelve to sixteen samples of methylated spirit tested grew sporing organisms, some of which were anaerobes yielding a foul smell on culture, and of six samples of absolute alcohol two also contained viable spores. Cultures from freshly distilled alcohol all proved sterile. In the preparation of catgut the solutions used for removing iodine from the sterilised gut are, Dr. Williams states, frequently prepared from non-sterile alcohol put into non-sterile Winchester bottles fitted with ordinary corks. The lips of these bottles over which the solutions are poured provide a good catchment area for dust. Such solutions provide every opportunity for contamination. During the last three years there have come to her knowledge eight cases of post-operative tetanus in various hospitals in Melbourne where suspicion has been directed to catgut as the likely source of infection. Most of the organisms she has isolated from infected catgut have proved non-pathogenic, but the possibility remains that dangerous infection may arise from polluted alcohol. Not only has alcohol itself no bactericidal effect on sporing organisms, but it is still without effect when biniodide of mercury 0·4 per cent. is added. Recognition of the fact that spirit is not bactericidal against sporing organisms, but may be made so by the presence of 0·1 per cent. of iodine should lead to the addition of iodine to the spirit used for the storage of ligatures of all kinds. For use in hospitals she suggests the sterilisation of catgut by the iodine method and its culture in bulk before use. Storage in spirit after culture removes the swelling and slipperiness engendered by prolonged contact with culture media. The sterility of the catgut can thus be certified more surely than if reliance is placed upon sterility tests based on fractions of a batch.

[1] See THE LANCET, 1936, i., 320.
[2] Freund, H. A., and Adler, S.: Jour. Amer. Med. Assoc., August 22nd, 1936, p. 573.
[3] Med. Jour. Australia, July 11th, 1936, p. 39.

CHEMOTHERAPY IN DIPHTHERIA

WHEN Behring introduced the serum treatment of diphtheria, the elaborate chemotherapy then in vogue was relegated to the dustbin. Subsequent experience has amply vindicated the soundness of his conception. Indeed such good results have been obtained with serum that we are nowadays concerned, not with its successes but with its occasional failures. For there is still a small group of cases in which, though administered early and in sufficient dosage, serum appears to fail. In seeking a remedy applicable to these cases French workers have been turning again to chemotherapy, and some of them record an impressive series in which strychnine medication seemed very useful.[1] This communication is interesting inasmuch as the investigators suggest that the principles hitherto governing strychnine medication are fallacious. Strychnine in small doses to combat established paralysis is, they consider, valueless. By comparison their doses are enormous, and they give it from the outset. Tolerance, they find, is vastly greater than has been imagined, and it is fortunately greatest where there is most need for it—that is, in children and in states of collapse. Neither renal nor (presumably) hepatic imperfections need constitute a bar; there is in fact only one absolute contra-indication, and that is croup. The conclusion reached is that all patients with really severe diphtheria should be given strychnine subcutaneously to the amount of 1 mg. per kg. of body-weight in every 24 hours. For practical purposes the total amount required on this formula is divided by 8 to give the dose to be administered every three hours, which is held to be the best interval. As a rule the maximum dose is not given at once; at first it is halved, and the maximum is slowly reached in three or four days. Where the situation is really desperate Paisseau and his colleagues do not stop at 1 mg. per kg., and they have sometimes gone up to 1·5 and even 2 mg. Even with this "brutal dosage," as they term it, they have had no accidents that could not be successfully dealt with. The treatment is continued for a fortnight and signs of intolerance must be carefully watched for. As the earlier ones—headache and vertigo—are subjective, small children need special attention. Increased reflexes and a positive Chvostek sign may next appear; should this happen the treatment must be temporarily abandoned, but it can be resumed later

[1] Paisseau, Braillon, Vaille, and Jannette-Walen: Presse méd., August 1st, 1936, p. 1241.

without hesitation, since not only does tolerance increase steadily but there are no cumulative effects. In the presence of such signs of poisoning as clonic contractions or strychnine tetany, chloroform must be administered at once to prevent asphyxia.

Chloroform is itself the basis of a new treatment of diphtheritic paralysis described by Dodel and Foucher.[2] Positing that such paralysis results from solution of the diphtheria toxin in the lipoids of the central nervous system, they argue that it should be possible to turn out the diphtheria toxin by presenting to the lipoids a toxin even more desirable. Such a toxin is chloroform. As soon therefore as a diphtheritic paralysis appears, they give the patient 30–60 c.cm. of aqua chloroformi by mouth, and then, half an hour later, a massive dose of antitoxin to attack the toxin, now evicted and wandering in the blood stream. This ingenious ratiocination is said to be rewarded clinically.

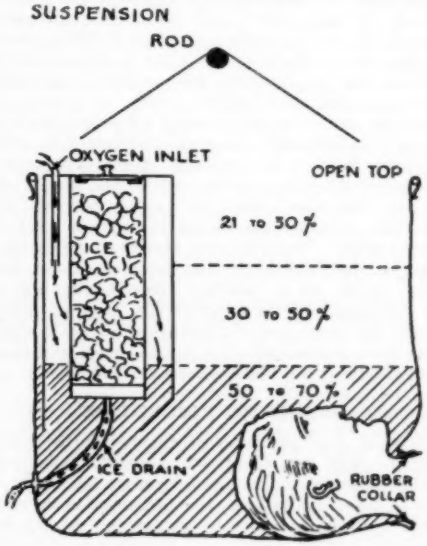
TREATMENT OF AORTIC SYPHILIS

THE question whether the cardiovascular lesions of syphilis are preventable by thorough treatment of the disease, begun soon after the initial infection, is one that time alone can answer completely. The effect of treatment on aortic lesions at a stage when they have become recognisable is generally held to be slight, and its influence on advanced lesions such as aneurysm and aortic incompetence is considered almost negligible. Cole and Usilton,[3] from an experience of 10,000 cases, believe that aortic syphilis often goes unrecognised and becomes irremediable because its early signs and symptoms are not correctly interpreted; but some of those they mention are usually associated only with the more serious lesions, and X ray examination, which they place first in importance, is hardly likely to be made in the absence of symptoms or the knowledge that a patient has had the disease. In properly treated syphilis, they say, cardiovascular lesions rarely appear within 20 years of infection, and in none of their patients so treated did aneurysm develop within this period. The patients with uncomplicated aortitis treated for 2–3 months with iodide by mouth and injections of a heavy metal, and then by a course of an arsenical preparation, lived longer than those that remained untreated or inadequately treated. Cole and Usilton prefer small rather than large doses of arsenicals, and write of the special need for caution when, as often, there is associated neurosyphilis. Study of a second series comprising 260 patients with aortic incompetence showed that very few had had early and thorough treatment. Yet even with this advanced condition it seemed that adequate treatment prolonged life. The initial dose of neoarsphenamine, after a preliminary course of bismuth, was not more than 0·05 g., and when angina was a symptom very great care was exercised, though it is not suggested that arsenicals should be altogether avoided in these circumstances. The report concludes with observations on 74 cases of aneurysm, of which three-quarters had not been treated at all before the aneurysm was detected. After treatment, which in general was the same as for those with aortic incompetence, symptomatic relief was obtained in about half the cases, and the duration of life in the adequately treated was twice that of the inadequately treated, though the relatively small numbers in the two groups reduces the value of the comparison. Emphasis is laid on the risks of using an arsenical in too big doses, or before adequate preparation, in the treatment of aneurysm; absence of these precautions is apt to lead to the therapeutic paradox—an increase of symptoms due probably to too rapid healing with fibrosis and distortion of tissues. When these symptoms are more acute they may be classed as a Herxheimer reaction; for example the aortic wall may become œdematous and even rupture.

[2] Dodel, P., and Foucher, A.: Paris méd., August 15th, 1936, p. 110.
[3] Cole, H. N., and Usilton, L. J.: Arch. Internal Med., 1936, lvii., 893.

THE INVERTED OXYGEN TENT

A NEW form of oxygen tent is now being tried out at St. George's Hospital. The closed bed tent devised[1] by Dr. E. P. Poulton has been given a prolonged trial at various London hospitals and has proved a safe and economical method of giving oxygen continuously, but dyspnœic patients, particularly if they are children, are very sensitive to their surroundings, and the unfavourable psychological effect of the apparatus has often come in to prevent the tent being used long enough for the relief of adequate oxygenation to be felt. In some hospitals it has been found that patients can hardly be induced to remain in it. If only this psychological oppression could be avoided there would be far better chance of finding out in what kind of cases the continuous administration of oxygen is likely to be helpful. Dr. Argyll Campbell pointed out in our columns recently[2] that if the administrator is prepared to use as much as six or eight litres of oxygen a minute, an open box-shaped face mask is all that is required, and it now appears that for some years the open box method has been in use in America. In the medical service of a Rhode Island hospital Dr. A. M. Burgess, and his son, a Harvard medical student of the same name, introduced[3] a method of oxygen therapy "based on the principle that if oxygen is introduced at a reasonable speed into a box with impermeable walls and floor but with the top open, a high concentration will be maintained in the lower part of the box despite free diffusion upwards." They devised a leak-



[1] THE LANCET, 1933, i., 245.
[2] Ibid., 1936, i., 805.
[3] New Eng. Jour. Med., 1934, ccx., 254.

proof curtain through which the patient's head could protrude into the box and later added an ice cooler, to dissipate the feeling of heat and oppression, which has the further advantage of increasing the percentage of oxygen at the bottom of the tent, since the cooled oxygen being heavier sinks. The diagram here reproduced illustrates the technical details. The hole for the head is shown in the side of the tent, but it may be found better to have the hole in the bottom as the adult patient who requires oxygen generally prefers the sitting or half-sitting posture. With this apparatus Dr. Burgess and his colleagues found they could produce a 40 to 65 per cent. oxygen atmosphere with a flow of only 4 to 5 litres per minute, and they soon found that especially for infants and children it possessed advantages over other methods of giving oxygen. We understand that the method has not yet been fully worked out here and that there are certain difficulties still to solve, but the principle is sound and the advantages of an open tent are obvious.

PAUL MORAWITZ

A SYMPATHETIC notice of the late Prof. Morawitz of Leipzig appears in the *Münchener medizinische Wochenschrift* of August 21st, from the pen of his friend, Prof. L. von Krehl of Heidelberg. Morawitz worked in succession at Tübingen, Strassburg, Greifswald, and Würzburg until in 1926 he accepted the chair of medicine at Leipzig; and at all these places he made peculiarly his own the study of the coronary arteries and their sclerosis, being responsible more than any other for devising methods of determining early pathological changes. Although his friends had long been aware of the contrast between a delicate constitution and the stress and strain of the Leipzig chair, the attack of angina pectoris which befell him on a holiday in the summer of 1934 came unexpectedly. He recovered slowly and returned to work, his death on July 1st being due to a second attack, again on a holiday. Besides having more than five hundred beds under his care at what is perhaps the most lavishly furnished clinic in Europe, Morawitz was also consulted far and wide and became one of the most popular clinicians of his time.

PROSTATIC INVOLUTION

Dr. Paul Niehans, who recently described in our columns[1] the treatment of prostatic enlargement by what is known as Steinach ligature No. 2, has now written more fully[2] on the relation between the testicle and the prostate in its bearing on the treatment of enlarged prostate. He quotes the results obtained by numerous experimenters in the field of endocrinology and arrives at the following conclusions.

(1) If there is a preponderance of the interstitial cells of Leydig in the testicle, the prostate increases in size and may become adenomatous.

(2) If the cells of Sertoli increase in number, the prostate atrophies.

(3) If what have been termed the F cells of Steinach increase in number, the prostate is liable to undergo fibromyomatous degeneration.

These results provide, in Dr. Niehans's view, not only a means of preventing prostatic enlargement, but of curing it once it has occurred. The three methods of endocrine treatment available are (*a*) injection of male hormone, (*b*) the grafting of testicular tissue, and (*c*) Steinach ligature No. 2. Good results, he says, have been reported from all three, and he advances much interesting and instructive evidence in support of a scientific basis for the form of treatment of which he is a well-known exponent. But endocrinology is not yet an exact science; the further we progress in the study of the endocrine glands, the more complicated and elusive appears the relationship between the various members of the endocrine circle. Only occasionally do we feel firm ground. Dr. Niehans is apt to regard opinions as matters of fact. Steinach's observation that the testicles of homosexuals contain female cells in the stroma has not been supported by other observers. Even his view that vaso-ligature in men increases the output of internal secretion is not generally accepted. The elaborate structure that Dr. Niehans has built up in support of his operation is found on more critical examination to rest on uncertain foundations. It is not by argument but by results that the operation which Niehans practises must be finally tested. Does the placing of a ligature around the efferent ducts of the testis in fact result in a diminution in the size of the enlarged prostate? This is the question for the surgeon to answer.

[1] THE LANCET, 1936, i., 307.
[2] Presse Médicale, July 1st, 1936.

" CONSCIENCE' SAKE "

THERE are still some doctors who regard themselves as primarily concerned with their patients' physical well-being, a narration of mental perplexities being received sympathetically as might be any other tedious story, but regarded as a problem whose solution is not exactly—" thank goodness "—the business of the medical adviser. This attitude cannot be justified; it is a relic of the arid period of medical practice between the time when the family doctor was freely consulted on such trivia as the plans for the summer holidays, the choice of a " finishing " school in Paris, or the wisdom of keeping a rough-haired dog, and the modern epoch of psychological approach even to such traumata as appear to be accidental. It is especially the doctor trained in the intermediate period, when great stress was laid on objective signs and symptoms and persons not showing these were liable to be labelled " neurotics," who is puzzled to know how to tackle a patient the source of whose troubles are not manifest. Among these imponderable anxieties a sense of guilt is the most embarrassing for both parties to the consultation, especially perhaps when the self-reproach is ill-founded. An aspect of the sense of guilt to which Dr. William Brown drew attention at the meeting of the section of psychology of the British Association is the exaggerated conscientiousness and self-reproach manifested by many persons with regard to certain aspects of duty. Often nothing has been amiss in their conduct in the direction in which they were anxious, but there were important defects of character elsewhere. Dr. Brown spoke of a student who, believing he had copied at examination, felt strongly that he did not deserve his degree; he was unable to give details of his transgression, but analysis showed quite different faults in his moral make-up, dating from very early years. Like many others, he had worried over the wrong thing. Dr. Brown suggested that some of those who paid " conscience money " to the Exchequer were really salving their consciences, not for some fraud on the tax-gatherer, but for some other fault. There were many who, unable to face their own real weakness, shifted their ground and blamed themselves for some fictitious misdoing, or blamed other people and projected upon them the guilt that was their own. " Censorious

people are people who, instead of dealing adequately with guilt in their own minds, are projecting it upon those around them. They feel the urge to get rid of it in that way." To show that a sense of guilt—not merely of fear—may cause or prolong physical illness, Dr. Brown described a patient whose kidney trouble dated from an imagined neglect of filial duty; and another who suffered from recurrent corneal ulcers and regarded these and the prospect of blindness as the penalty for blasphemy. In both cases the condition disappeared after the matter had been talked out thoroughly with a sympathetic physician. Such cases showed how carefully methods like faith-healing should be approached, for the indiscriminate use of such methods would often intensify the subconscious sense of guilt which had made the person ill. Analysis was often necessary as a first procedure. From the psychological point of view Kant's great ethical generalisation, "I ought; therefore I can," might well be reversed to "I can; therefore I ought." It may be, as Dr. Brown holds, that the general adoption of this attitude would change much of what is unsatisfactory in the life about us, but it smacks rather too much of "might is right" to make it a safe motto in this disturbed age.

THROMBOCYTOPENIC PURPURA

IT has often been observed that knowledge of the ætiology of diseases often varies inversely with the number of remedies advocated for its cure. Essential thrombocytopenic purpura—a condition characterised by bleeding into the skin and from the mucous membranes, unassociated with any recognised blood disease, but with a low platelet count—has in the last few months been reported to be relieved by very various methods. Mettier, Stone, and Purviance[1] claim that Röntgen ray irradiation of the spleen in doses of from 200–300 *r* units will lead to a remarkable increase in platelets and a cessation of bleeding. Two out of seven patients studied had a recurrence of symptoms some months after treatment was finished, but they reacted well to further irradiation: only one patient failed to respond. The authors admit that it is hard to explain the results obtained, but suggest that irradiation possibly prevents phagocytosis of platelets by the reticulo-endothelial system. Lowenburg and Ginsburg in 1932 reported a case of essential thrombocytopenic purpura that recovered completely after an accidental overdosage with parathyroid extract and consequent hypercalcæmia. They have recently described a further case.[2] On admission the patient's bleeding-time was normal but it gradually increased to over two hours while under observation. The platelet count was 70,000. Hypercalcæmia was induced by injection of parathyroid extract and the bleeding-time and platelet count became normal and have not altered since. Lowenburg and Ginsburg offer no explanation of the results obtained, but suggest that the treatment of thrombocytopenic purpura by the induction of artificial hypercalcæmia is at least worth trial. Miller and Rhoads[3] report that in four cases of idiopathic thrombocytopenic purpura a persistent rise in the number of thrombocytes and complete relief of symptoms followed the administration of ascorbic acid (vitamin C). In two such cases, in which vitamin-C excretion was measured quantitatively, clinical improvement and an increase in the number of thrombocytes were associated with an increased urinary output of the acid. No effect on the platelets or on the hæmorrhagic symptoms was obtained in cases diagnosed as leukæmia, or aplastic anæmia. In classical scurvy the platelet count is not reduced, nor is it affected, as far as evidence is available, by the administration of vitamin C. The mechanism disturbed, therefore, in scurvy and thrombocytopenic purpura is presumably not identical, but there are obvious points of similarity between the two conditions. As mentioned in our annotation last week (p. 640) Rusznyák and Szent-Györgi have failed to obtain any effect with pure ascorbic acid on the platelet count in purpura, though they found an impure preparation effective. It is possible that the difference in the chemistry of the ascorbic acid used by the American and by the Hungarian workers may explain these conflicting results. Even if these observations are confirmed by other workers it is at present difficult to see any satisfactory link between ascorbic acid, Röntgen ray radiation, and hypercalcæmia.

[1] Mettier, S. R., Stone, R. S., and Purviance, K.: Amer. Jour. Med. Sci., 1936, cxci., 794.
[2] Lowenburg, H., and Ginsburg, T. M.: Jour. Amer. Med. Assoc., 1936, cvi., 1779.
[3] Miller, D. K., and Rhoads, C. P.: Jour. Clin. Invest., 1936, xv., 462.

LEPROSY THROUGH INDIAN EYES

INDIAN interest in the very difficult problem of leprosy is reflected in a special number of the *Indian Medical Journal* (July, 1936), the organ of the All-India Medical Licentiates' Association. It contains no fewer than 23 articles, written by 20 different authors engaged in anti-leprosy work, together with an appendix dealing with leprosy associations and other matters of general interest. As is inevitable with so many contributions there is a certain amount of repetition; but between the various writers nearly every aspect of leprosy has been adequately dealt with. The only important subject on which no special article is contributed is prognosis, lately considered by Dr. E. Muir in our own columns.[1] In an editorial however the following opinion is expressed:—

> "While it is necessary for purposes of scientific discussion and research to maintain and cultivate such niceties of distinction between the infective and the non-infective type or stage, it is, we believe, rather dangerous to carry this fact to the attention of the un-discriminating public. It would merely enhance without any advantage the danger of greater promiscuity and reduce the salutary fear of infection. Our plea, therefore, to the leprosy workers is that they should not stress on nor hint at the non-infectious stage and type of this disease in their propaganda among the public. That will forfeit the very purpose of propaganda."

With this statement we disagree, on the ground that there is in practice great advantage in a distinction between infectious and non-infectious cases. In India more than half the cases belong to the latter category, and in an immense number the hope of recovery depends on the patient being able to retain his employment and his place in society. If counted infectious, he must lose his work and be isolated from his fellows, and the mental and physical depression that follows will favour the rapid increase of the disease. After all, more than half the cases of leprosy in India are no moré capable of spreading leprous infection than cases of gland and bone tuberculosis are capable of spreading infection with the latter disease. In both diseases the "closed" form of the disease may advance to the "open," but both in individual prognosis and in public health propaganda a clear distinction should be made between the two. Physicians, through ignorance or carelessness

[1] THE LANCET, August 15th and 22nd, 1936, pp. 391 and 448.

may mistake the one for the other, but that is no reason why this very important distinction should not be made. The suggestion also is made that it is the early cases "that broadcast the infection and that can be 'cured'": and here again we would disagree, preferring the opinion of all but a few leprologists that it is the well-developed case, in which the bacilli have multiplied to a vast degree, that spread the disease. In other respects however this symposium is open to little criticism and much praise, and we congratulate the *Indian Medical Journal* on the energy and enterprise that have gone to its production.

HAVELOCK ELLIS TO-DAY

THE recent election of Havelock Ellis to the Fellowship of the Royal College of Physicians betokens the unquestioned respect with which this distinguished scientist is now regarded by medical men. It was not always so. In a foreword to the new edition of his Studies,[1] he relates the treatment to which his books on the psychology of sex were at first subjected, and the reasons why they had to be published outside England. With this new edition he feels that his work passes beyond the pioneering phase; "it is to-day almost universally accepted, where it is not actively urged, that definite knowledge of so deeply vital a subject is necessary for all, and that without it life must ever remain perilous." His studies have played an important part in bringing about the change. The fullness of the data he has accumulated make these four volumes a storehouse, the richness of which is sometimes overlooked by psychiatrists and anthropologists. In their clearness of exposition the books remind one that the author is an accomplished essayist and critic whose style has been exercised in many fields. It is a pity that the collected writings of Havelock Ellis on other topics are not issued in a supplementary set of volumes, uniform with the four now published: in them will be found the same integrity, the same breadth of experience, the same intelligence and moral force that link together all the writings of this great humanist.

PREMATURE BABIES IN CHICAGO

FOR some years the "premature station" at the Sarah Morris Hospital in Chicago has been proving that better organisation can do much to improve the chances of the prematurely born baby in both mortality and morbidity. At the beginning of 1935 the lessons thus learned were applied to Chicago as a whole, and the inspirer of this work, Dr. Julius H. Hess, has recounted [2] the results of the first year's work. The initial step in the city's attack on the problem was to know its extent. Notification of all premature births was therefore made compulsory; the Board of Health requires to be told at once by telephone, and this must be followed by written confirmation within 24 hours. The next step was to secure a supply of nurses trained in the management of premature infants. Nurses on the staff of the Board of Health were assigned in small groups to two hospitals with premature stations. As soon as three nurses had been trained the city was divided into three districts and one nurse took charge of all the premature babies in each. As other nurses finished their training and as the work grew, additional nurses were assigned to the district as needed. Altogether 165 of these nurses have been trained. The nurses have worked in closest coöperation with the medical practitioners concerned in individual cases, and when the baby is not under the care of a doctor the nurse becomes solely responsible. If there is a feeding problem or illness and the parents are unable to pay for a doctor, a physician experienced in the care of infants calls and advises them. Special attention is paid to the method of manual expression of breast milk so that mothers could be taught how to maintain supplies for their infants. In this connexion it is also recorded that one of the stations managed to organise its collection of human milk so efficiently that nearly 80,000 oz. were made available during 1935. If babies are born in hospital, or have to be admitted, the district nurse takes steps to arrange for their return home. The city has also purchased a number of heated beds for lending to institutions and homes where it is otherwise impossible to maintain the body temperature. An "incubator ambulance" was also provided to transport infants from homes and institutions when necessary to centres where better facilities were available. A copy of a pamphlet containing details of the minimum requirements for the hospital care of premature babies was sent to every hospital to be posted in a conspicuous place in the nursery.

The results of these efforts are reported statistically, but it is difficult exactly to assess the benefits obtained, since previous data on the death-rates among premature babies appear to be missing. For Chicago as a whole the infant mortality-rate among children under 1 year dropped from 47·7 per thousand in 1934 to 40·1 in 1935. Of the 1862 babies classified in 1935 as prematurely born the mortality-rate was 42·6 per cent. from all causes. It should be noted that the corresponding mortality-rate at the Sarah Morris Hospital station over the past five years has been just over 24·0 per cent., and at the Cook County Hospital it has been reduced from 49·2 per cent. in 1932 to 24·8 in 1935, illustrating what can be done by organised effort. Skilled nursing, a supply of human milk, and some means of keeping the babies warm seem to be the main lines along which success has been achieved.

A SERVICE in memory of Lord Moynihan was held on Monday at St. Martin-in-the-Fields, London, when a large assembly was present representing important institutions and corporations in the country associated with medicine, the Duke of York, the Admiralty, the Ministry of Health, and the Lord Chancellor. The service was conducted by the Rev. W. P. G. McCormick.

TORQUAY SCHOOL CLINIC.—A new school clinic and infant welfare centre, costing £4000, was opened at Torquay on Sept. 7th by the mayor.

INTERNATIONAL PÆDIATRIC CONGRESS.—It has been decided by the Italian committee of the International Pædiatric Association that the fourth international congress will take place in Rome on Sept. 27th to 30th, 1937, concurrently with the meeting of the International Society for the Protection of Infancy. The programme will be the same as that arranged for the proposed congress in 1936, but an extra day has been added so that more time for communications on the subjects to be discussed will be available. Members who wish to take part in these discussions must send a précis of their communications to the secretary of the British committee, Dr. Leonard Findlay, 14, Wimpole-street, London, W.1, before May 30th, 1937, so that they may be forwarded to the Italian committee with whom the ultimate decision rests.

[1] Studies in the Psychology of Sex. By Havelock Ellis. Complete in four volumes. New York: Random House. 1936. £4 4s.

[2] Jour. Amer. Med. Assoc., August 8th, 1936, p. 400.

PROGNOSIS

A Series of Signed Articles contributed by invitation

CXIV.—X RAY AND RADIUM INJURIES OF THE SKIN AND MUCOUS MEMBRANE

THE term "burn" which has been applied to X ray and radium injuries of the skin is an unfortunate one. It implies to the mind of the patient and of his doctor carelessness or lack of judgment on the part of the radiologist. Erythema and moist desquamation, which are analogous to superficial burns, are an essential part of radiation therapy, whereas such serious effects as massive necrosis or dermatitis differ in their pathology from the result of any direct application of heat to the tissues.

There are certain differences between the effects of X rays and those of radium, due chiefly to the different methods of application, but for convenience they are here considered together. The injuries which may be produced by radiation may be divided into: (*a*) Early effects: (1) normal reactions; (2) excessive reactions; (3) acute necrosis. (*b*) Late effects: (1) late necrosis; (2) dermatitis; (3) superimposed malignancy.

Early Effects

In the present state of our knowledge the adequate treatment of malignant disease appears to involve the production of well-marked reactions. When the disease is situated in a centrally placed organ such as the œsophagus or the uterus it can only be reached through the skin, and the importance of the skin tolerance is so great that the biological unit of dosage is measured by the effect of the radiation in producing an erythema. That amount of radiation which will produce an erythema if given at a single sitting is called the unit skin dose (U.S.D.); skin tolerance can be increased by fractionating the dose, and if treatment is given every day for four weeks three times the unit skin dose will produce the same degree of erythema. The dose to the tumour must, however, be high enough to be lethal to all the malignant cells. The exact lethal dose for tumours of varying histology is not yet known, but it seems to be necessary to deliver from 3–5 U.S.D. throughout the volume to be treated. The tumour may lie so far below the surface that it only receives an average of 30 per cent. of the dose received on the skin, and in this case it becomes impossible to arrange enough fields to deliver the lethal dose without producing the greatest effect on the skin which can safely be tolerated. By extending the duration of treatment to six weeks the margin of safety can be increased. The size of the fields and the wave length of the radiation are also important factors.

The variation in sensitivity of the skin over different parts of the body must be borne in mind. The scalp is extremely resistant, but the patient must be warned that permanent epilation will follow. Folds of skin where moisture collects are always sensitive; the axilla is thus a difficult region for irradiation, the groin even more so, and pendulous breasts may cause trouble. The vulva is so sensitive that only about one U.S.D. can be given over four weeks instead of the three U.S.D. which can be given in other areas.

NORMAL REACTIONS

If the rule that dosage must be as high as is compatible with safety is accepted fairly severe reactions must be regarded as normal. Three degrees are described:—

(1) A faint erythema, which may be followed by slight pigmentation disappearing after a few months.

(2) A marked erythema. The skin is bright red and dry desquamation may occur. It may be followed by permanent pigmentation.

(3) Moist desquamation. The skin is a dusky red and numerous small blisters form and run together. The epidermis peels off in patches leaving the dermis exposed. It may be followed by permanent pigmentation and later by telangiectasia.

In most cases moist desquamation is produced over part at least of the fields treated. This reaction is almost always described as a burn, but the prognosis is excellent, healing being complete in three weeks.

EXCESSIVE REACTIONS

Occasionally an excessive reaction is produced. A large area may be denuded of epidermis, and the exposed dermis is very tender, and bleeds readily, particularly if the dressings are allowed to stick to it. Treatment consists in covering the whole area with a thick layer of ointment spread on white lint. Until the irradiation is complete plain vaseline is used, or in cases where vaseline proves irritating lanoline may be substituted. As soon as treatment is finished zinc and castor oil ointment should be applied, and Viozin ointment (Glaxo Products) is useful to promote healing. No antiseptic lotions must be applied; even boric is irritating. The lint must be plain, and the vaseline must not contain carbolic. The patient should be warned against the application of heat in any form even after healing is complete, and radiations of any kind must be avoided, sun baths being a potential danger.

So far no case has been recorded in which malignancy in the skin appeared to be the direct result of a single course of radiation treatment even when high doses were given. Even an excessive reaction should be healed in six weeks, though some atrophy of the skin remains, possibly with telangiectasia.

NECROSIS

Acute radiation necrosis was seen in the early days of X ray diagnosis when very long exposures, such as 45 minutes, were required to obtain a radiogram of the hip-joint. It is now of historical importance only.

Excessive reactions may, however, progress to actual necrosis. This sometimes occurs in the vulva, and has followed combined applications of radium and X radiation. It may be seen in the groins, and it may also be produced in the posterior fields used for the irradiation of the cervix in very fat patients. Here pressure is also a factor, interference with the blood-supply being caused by the weight of the body resting on the part. If the area involved is small it may be excised and repaired by means of grafts; in the acute stage healing will take place. Larger areas should be coagulated with the diathermy button, and when the slough separates healthy granulations will remain. The immediate prognosis is good, provided treatment is adequate, but there must in such cases be a possibility of late reactions. If the necrosis was due to faulty technique producing a local overdose, excision may have got rid of all the damaged tissue, but it is more likely that treatment

of the whole area was carried beyond the margin of safety. The affected skin must therefore be guarded against injury, since very slight trauma is likely to produce serious results.

REACTIONS IN MUCOUS MEMBRANE

The early reactions due to radium are similar to those due to X radiation so far as the skin is concerned. In mucous membrane the changes with either form of radiation are essentially the same, but instead of moist desquamation a yellow membrane forms over the part treated. Mucous membrane appears to regenerate more easily than does skin, and to tolerate a high dose. When external radiation is given for the treatment of lesions of the mouth and throat the formation of this yellow membrane is usually regarded as a sign that a sufficient dose has reached the epithelium of the cavity.

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(*To be concluded*)

SPECIAL ARTICLES

RELATIVE VALUE OF RAW AND HEATED MILK IN NUTRITION

BY ELFREIDA C. V. MATTICK, M.Sc., Ph.D. Bristol
AND
J. GOLDING, D.S.O., F.I.C.

(*From the National Institute for Research in Dairying, the University, Reading*)

PART II *

SOME of our results in feeding raw and sterilised milk to rats—the milk diet being supplemented only by a biscuit made from flour and water—were of sufficient interest to warrant further inquiry.† In this second experiment a group on pasteurised milk—i.e., milk heated to 145°–150° F. for half an hour and then cooled rapidly—was introduced, while the treatment of the raw and "fresh" sterilised remained exactly as described in Part I.

THE SECOND EXPERIMENT AND ITS RESULTS

Thirty-six rats were chosen at weaning from seven stock litters, and litter brothers and sisters were distributed amongst the group as evenly as possible. It was decided that three consecutive matings should be attempted in each group, and that an endeavour should be made to keep the numbers and matings as similar as possible. For this reason, and also lack of accommodation, many puppies were destroyed, and it appears to us that, in this particular experiment, a comparison of weights and physical attributes may be more trustworthy as an indication of any differences in the nutritive values of the different types of milk, than a comparison of numbers born or weaned.

The reason for this is clear when one considers that, as a result of first matings on raw and pasteurised milk, pups were weaned from four litters on raw milk and only one on pasteurised, which at once precluded all possibility of cross-mating between the four raw-milk litters in this group in the second generation; it also necessitated the complete destruction of one of these four litters in which there was no doe weaned. The numbers and generations obtained when adjustments of this nature had been made throughout the experiment are shown in Table III.

The Table shows that, as the result of all matings, 874 puppies were born. Including the original groups, six successive generations were raised on a diet of biscuit and *raw milk* only. The later generations were very small in number, but it was the fact that the only doe which was weaned in the fifth generation died young, which precluded the possibility of a sixth. On *pasteurised milk*, four generations were raised. It was not a lack of does but failure to raise litters which precluded further litters in this group. It appeared that beyond the fourth generation, failure to lactate persisted. On *sterilised milk*, even in the first generation, all does failed to produce litters, although 15 matings were attempted. This result compares with 91 pups produced in each of the other two groups from litter sisters of these does, with 17 and 16 possible matings respectively, and confirms in a striking manner those of our first experiment. It seems difficult to explain these results otherwise than by the conclusion that sterilisation, under the conditions described, has destroyed some nutritive property of the raw milk.

TABLE III

Numbers of Generations in Different Groups in Expt. II

A. = Possible matings. B. = Litters seen.
C. = Pups seen. D. = Pups weaned.

Generation.	RAW.				PASTEURISED.				STERILISED.‡
	A.	B.	C.	D.	A.	B.	C.	D.	A.
I.	17	13	89 (+2)†	40	16	13	91	36	15
II.	31	21	159	39	27	25	186	59	..
III.	39	23	120	2	34	25	163	27	..
IV.	4	4	16	5	12	6	37	0	..
V.	3	1	7	3	..	..	..	..	..
VI.	None*	..	..	..	..	..	..	..	..

* As bucks only. † One doe died during parturition; two pups remained unborn. ‡ *Sterilised.*—B.C.D. = Nil.

A comparison of the average weights in successive generations of animals in each of the three groups at 120 days receiving respectively raw, pasteurised, and sterilised milk is shown in Table IV. The weights of all rats alive on these dates are included, although for reasons already given in an earlier paragraph some of these may not necessarily have been mated. In cases where does were mated earlier than 120 days the weight on the day of mating has been used and the age indicated.

The differences in the average weights of the different groups have been investigated statistically and the results are also shown in Table IV. (The average weight curves are shown in Figs. 3 and 4.) Statistical calculations show that there are significant weight differences between the raw and sterilised milk groups of rats, both bucks and does, even in the original group (or first generation). The apparent difference between the raw and pasteurised group of bucks is not significant, neither are the differences in the second generation, but in the third

* Part I. appeared in THE LANCET of May 16th, p. 1132.
† Details of technique and results of the first mating were published in THE LANCET in 1931 (vol. i., p. 662), together with individual and group curves to the date of the first mating.

TABLE IV.—AVERAGE WEIGHTS OF SUCCESSIVE GENERATIONS AT 120 DAYS

Treatment of milk.	BUCKS. Generation.	No. of rats.	Average weight g.	Difference in weight.	2× standard error of difference.	Significance.	DOES. No. of rats.	Average weight g.	Difference in weight.	2× standard error of difference.	Significance.
Raw*	I.	6	225	..	..	..	6	168	..	..	..
Pasteurised*	I.	6	200	25	29	−	6	166	2	15·8	−
Raw*	I.	6	225	..	..	..	6	168	..	..	..
Sterilised*	I.	6	145	80	17·8	+	6	133	35	23·4	+
Pasteurised*	I.	6	200	..	..	..	6	166	..	..	..
Sterilised*	I.	6	145	55	25·6	+	6	133	33	19·0	+
Raw	II.	11	212	..	..	..	13†	163	..	..	..
Pasteurised	II.	12	211	1	22·8	−	13‡	150	13	18·2	−
Raw	III.	14	225	..	..	..	19	176	..	..	..
Pasteurised	III.	23	162	63	24·8	+	25§	135	41	10·4	+
Raw	IV.	1	232	..	..	..	1	185	..	..	..
Pasteurised	IV.	10	192	40	..	..	11	143	42	..	..
Raw	V.	3	194	..	..	..	1	174	..	..	..
Raw	VI.	2	171	..	..	..	..	..	..	..	..

* Student's formula for small numbers (Biometrika, 1908, vi., 1) as revised by S. H. Jeffreys (Proc. Roy. Soc. A., 1932, cxxxviii., 48) is used in these calculations. † 3 does at 117 days; 6 at 119 days. ‡ 4 does at 118 days; 2 at 113 days. § 2 does at 117 days.

generation both bucks and does are significantly heavier on raw than on pasteurised milk and probably in the fourth generation, although as the raw groups in this generation contain only one animal the comparison cannot be satisfactorily estimated. As no fifth or sixth generation was weaned on pasteurised milk no further weight comparisons are possible.

Similar calculations (not shown) made on litters of animals from three successive matings which comprise the second generation, indicate that the difference between the groups on different milk is not emphasised by the age of parents at mating as between 157 and 334 days, nor the season of the year as between the months of November, February, and April.

Rats on "sterilised" milk transferred to "raw" milk group.—The weights and conditions of the rats which had been kept on sterilised milk were so inferior to all others, that three of the does were transferred from a sterilised to a raw-milk diet when 298–300 days old. By this time three of the bucks (one of which had shown marked symptoms of vitamin-B

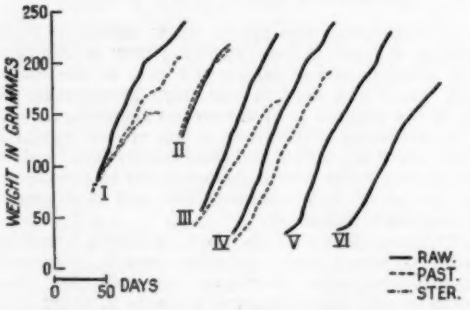

FIG. 3.—Rate of growth in successive generations. (Second experiment.) Bucks.

deficiency) were dead, and two of the three remaining died within three months. None of the group on raw milk and only one buck on pasteurised milk died in the course of the experimental feeding in this generation.

A striking improvement in condition of the does after a few weeks on raw milk was noticeable, and the growth increase of two of them is evident from the curves shown in Fig. 5. The third animal was found to have abnormal teeth and was removed from the experiment. Another somewhat striking result was

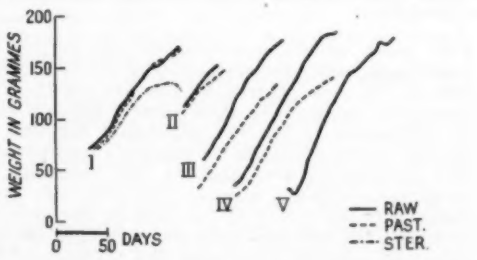

FIG. 4.—Rate of growth in successive generations. (Second experiment.) Does.

shown when one of these does at an age of 426 days gave birth to a litter (four dead puppies) after mating with a raw milk-fed buck. This was of particular interest because previous to this, 15 matings had been attempted with does and bucks both reared on sterilised milk, and no signs of pregnancy were shown on any one of these occasions.

Loss of hair in pasteurised milk group.—Figs. 6 and 7 illustrate a difference in condition which was shown on some occasions between those rats which received raw and those receiving pasteurised milk—a loss of hair which appeared at the time of losing puppy coat (and occasionally returned later) which persisted for varying lengths of time, sometimes for several weeks, and is suggestive of a deficiency of vitamin B.

This condition was never seen on rats receiving raw unheated milk, neither was it found in the original (or first generation) rats; but in the second generation it was shown at 53 days in five out of a group of six does, and in four out of five bucks, and in the third generation in five out of a group of six bucks at 50–52 days, and in another group of eleven bucks at 86–94 days. The difference in age of the two single rats shown, one of which was receiving raw and the other pasteurised milk, was only one day, and in weight 2 grammes. The buck parents were litter brothers and the mothers were litter sisters.

Bone analysis.—Analyses for percentage of moisture, ash, calcium, and phosphorus were made on the leg bones of 23 rats of the second and third generations in this experiment. Calculations of the results showed that there was little difference in the percentage of ash, calcium, and phosphorus between the groups fed on raw and heated milk when calculations were made on the weights of dry fat-free bone, and that such differences were not statistically significant for either group in the second or third generation.

Red cells and hæmoglobin blood content.—Fifty-eight counts of red cells and hæmoglobin estimations

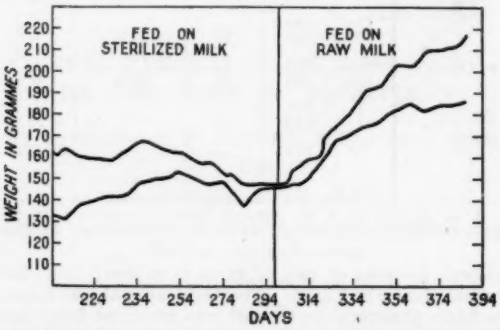

FIG. 5.—Growth curves for two does transferred to raw milk after eight months on sterilised. (Second experiment: first generation.)

were made on second-generation rats during this experiment, using the methods already described in Part I. Of these, 27 were on the raw and 31 on the pasteurised group, with ages between 233–406 days. No differences in the red cell counts between the raw and pasteurised milk-fed rats were demonstrable. The hæmoglobin was high in the blood of the pasteurised milk-fed animals, the difference being statistically significant in the case of one group of does aged 233–338 days, from corresponding matings. This may possibly be due to the presence in the pasteurised milk of traces of copper absorbed during the heating in a tinned iron vessel.

Macroscopical examination of teeth.—The jaws of four rats from this experiment and two from a later one were sent—unlabelled—to Dr. Evelyn Sprawson who, very kindly, made a macroscopical examination. It was reported that the teeth of one fourth-generation doe on pasteurised milk was by far the worst of any submitted while a fourth-generation doe on raw milk showed no caries. A third-generation buck on raw milk showed no caries and was by far the best of the six submitted, and no caries was shown in the jaws of a third-generation buck on pasteurised milk. The age of the two does was 350 and 368 days and the bucks 399 and 395 days respectively. It is of interest that "by far the best" was a buck receiving raw milk and "far the worst" a doe on pasteurised milk.

Technique of pasteurising.—Care was taken to reproduce the conditions of pasteurisation throughout the experiment.

The milk taken from the same bulk as the raw was poured into a sterilised tinned iron container which was lowered into a heated water-bath to raise the temperature of the milk rapidly to 145° F. The milk was stirred mechanically and at the end of half an hour the container was cooled in running water as rapidly as possible. Exact daily records were kept of the time taken to reach 145° F., the maximum and minimum temperatures acquired during the half-hour heating, the time taken for cooling, and the temperature to which it was cooled. July 8th, 1930, until May 5th, 1933, was the period of pasteurising for this experiment. From March 1st, 1933, until May 5th the tinned iron vessel was replaced by one of pyrex glass, but as this was such a relatively short period the details of this method will not be considered here. From July 8th, 1930, to Feb. 28th, 1933, 920 samples of milk were pasteurised.

The efficacy of the method in reducing numbers and destroying coliform organisms was tested periodically and found to be satisfactory.

CONCLUSIONS

(1) Three groups of rats, from seven litters, were placed on experimental diets at the age of 40–42 days. The rats were fed entirely on milk (raw, pasteurised, or sterilised) plus dry biscuit made of English flour and water only, throughout the experimental period.

(2) Excluding the original rats, five generations were raised on raw milk, three on pasteurised milk, and none on sterilised milk. The total number of puppies born was 874 (393 raw, 477 pasteurised, and 4 from a doe which was mated with a raw-milk buck, subsequently to the changing of her diet from sterilised to raw milk; none were born to animals receiving sterilised milk).

(3) None of the group receiving raw milk, 1 buck receiving pasteurised milk, 5 bucks and 1 doe receiving sterilised milk, died during approximately the same experimental period.

(4) Statistical calculations show definitely higher average weights in the rats receiving raw or pasteurised milk as compared with those receiving sterilised milk.

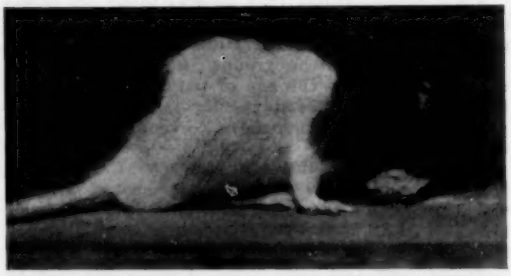

FIG. 6.—Second-generation buck on raw milk. Coat in excellent condition. Age 58 days. Weight 77 g. (Second experiment.)

(5) Statistical calculations show definitely higher average weights in rats receiving raw as compared with those receiving pasteurised milk in the case of both bucks and does in the third generations, but not in the original or in the second generation.

(6) Attention is drawn to a loss of hair shown by some rats of the second and third generations receiving pasteurised milk, which did not occur in corresponding groups of raw milk-fed rats, and is suggestive of vitamin-B deficiency.

(7) Two does which had received sterilised milk for about eight months showed remarkable improvement after receiving raw milk for about eleven weeks and one gave birth to a litter (dead when found—probably stillborn) when mated to a buck from the raw-milk groups.

(8) Analyses of bones, the results being calculated on dry fat-free bones, showed statistically insignificant differences in composition as between the raw and pasteurised milk-fed animals in second and third generations.

(9) The differences in the red cell and hæmoglobin content of the blood of the rats receiving raw and pasteurised milk were statistically insignificant in

three groups investigated (third-generation bucks and does) while one group of does on pasteurised milk showed a higher hæmoglobin value than the corresponding group on raw milk. The possibility that this may be due to minute quantities of copper entering the milk during pasteurisation in tinned iron vessels is suggested.

(10) The technique of pasteurisation is outlined.

PART III

In the third experiment two groups of rats only were used—one receiving raw milk and the other receiving milk which had been heated for half an hour at 145°–150° F. Thirty-six rats were weaned at 21 days from seven litters, and distributed between the two groups. The results of mating are shown below in Table V. In this experiment all does were mated at an approximate weight of 180 g., unless they were obviously in bad condition or very wheezy.

FIG. 7.—Second-generation buck on pasteurised milk. Much loss of hair. First cousin through both parents to buck shown in Fig. 6. Age 59 days. Weight 79 g. (Second experiment.)

A total of 570 puppies were born during this experiment of which 103 were weaned in two successive generations.

The relative weights of the rats in successive generations are shown in Table VI. and also the statistical significance of the differences of the average weights in different groups. The average growth curves for bucks and does respectively are given in Fig. 8.

TABLE V

Results of Mating Successive Generations

Treatment of milk.	Generation.	Attempted matings.	Litters seen.	Pups seen.	Pups weaned.
Raw.	I.	17	15	99	38
,,	II.	30	16	122	9
,,	III.	(No does)	..	..	..
Pasteurised.	I.	17	13	103	36
,,	II.	40	27	202	20
,,	III.	11	7	44	—

The differences in the mean weight of the rats on raw and pasteurised milk, both bucks and does, are not significant in either generation, but in the third generation the animals of one litter produced on pasteurised milk were abnormally small, as shown in Fig. 9. The rats in this particular litter were similar in size and appearance to those which had been raised in earlier experiments on sterilised milk. The peculiarly bright and protuberant eyes shown by these small rats was also a typical feature of the undersized animals receiving sterilised milk in the earlier experiments.

Bone analysis.—Analyses of leg-bones of three second-generation and one third-generation buck on raw milk, and of three second-generation and one third-generation buck on pasteurised milk were made.

The mean values for ash, calcium, and phosphorus calculated on dry fat-free bone is in each generation slightly greater in the raw than in the pasteurised-milk group, but the differences were found to be statistically insignificant.

FIG. 9.—Third generation on pasteurised milk. Doe, aged 302 days. Weight 110 g. (Third experiment.)

The *loss of hair* amongst the animals receiving pasteurised milk to which attention was drawn in the previous paper was again evident in this experiment, appearing amongst the does in the second generation in seven does from two litters from amongst a total of nineteen, and in one group of third-generation does in one out of three. It was not shown in any rats receiving raw milk.

Red cells and hæmoglobin content.—Eighty-four estimations of the number of red cells (37 raw and 47 pasteurised) and 81 of the hæmoglobin content were made on the blood of 48 rats of the second and third generations. The only statistically significant difference between any corresponding group on raw and pasteurised milk was shown in the hæmoglobin of a group (9 on raw and 15 on pasteurised —all different animals) of second-generation does aged 280–294 days. The hæmoglobin in the blood of the rats receiving raw milk was definitely higher than in that of the pasteurised-milk group.

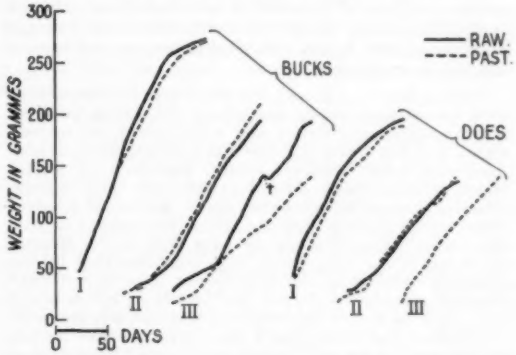

FIG. 8.—Rate of growth in successive generations. (Third experiment.)

Details of pasteurisation.—Between August 21st, 1931, and Feb. 28th, 1933, milk for the experimental feeding of the rats used in this experiment was pasteurised by the technique described in Part II., using a tinned iron vessel on 512 occasions. On March 1st, 1933, a fourth experiment (not included in this series) was begun in which the properties of

milk pasteurised in tinned iron and hard-glass vessels respectively were compared.

The rats receiving pasteurised milk remaining in Experiment III. on March 1st, 1933, were, on and after that date, given milk which had been heated in glass. Between June 6th, 1933, and Nov. 9th, 1933, all milk was given in inverted sterilised bottles. An attempt was made to give always a quantity which would ensure that practically

TABLE VI

Average Weights of Rats in Successive Generations at 120 days

Treatment of milk.	Generation.	Numbers		Average weight.		Difference in weight.		2 × standard error of difference.	
		♂	♀	♂	♀	♂	♀	♂	♀
Raw.*	I.	8	9	262	194	..	..	..	..
Pasteurised.*	I.	9	9	257	190	5	4	24·4	18·8
Raw.	II.	17	15	155	128	..	..	..	..
Pasteurised.	II.	13	21	168	132	13	4	23·6	14·8
Raw.	III.	1	—	153	—	..	..	..	..
Pasteurised.	III.	5	10	111	142	42	..	..	..

Significance.—Male and female: Nil.

* Jeffrey's form of student's correction used.

the whole of the fat was taken, but it is obvious that there is a possibility that the proportion of butter fat ingested may be greater when the milk is taken from an open dish. Occasional estimations of the percentage of fat in composite samples of the milk, made by mixing respectively all the raw and pasteurised residues before giving the next feed, confirmed this supposition. The later matings of the second generation on pasteurised milk were made after the change to glass-heated milk, but only one group in the third generation were mated after inverted bottles were introduced.

Discussion.—The fact that only three generations were raised on raw milk could not be associated with changes in technique it therefore seems that an explanation must be sought either in the original rats or in the milk-supply. The milk throughout was received from the same source and, as far as is known, was produced and taken under conditions similar to those of Experiments I. and II. A change in the diet of the stock rats from which the original generation were taken was made between the second and third experiment.

For the first and second the stock rats had been kept on a varied and largely fresh food diet which included raw meat, cabbage, brown and white bread, boiled fish, wheat, &c., but before the third, an artificial diet had been introduced which included wheat, linseed cake, casein, brewer's yeast, butter, calcium carbonate and sodium chloride, fresh milk and water, carrot daily, and ox liver twice weekly. Liver was not given to bucks. In this connexion it is interesting to note that L. L. Mapson (Biochem. Jour., 1932, xxvi., 970) considers that he has produced evidence of the existence in liver of a dietary principal stimulating growth and lactation, which is not identical with any of the hitherto (1932) known accessory food factors and which has a more marked effect on the growth rate of the male than the female rat. He says that the stimulating effect on the growth rate *after weaning* is transmitted from a parent which has received the active substance in its diet to the first but not second generation fed solely on the synthetic diet, and that the growth acceleration in the animals is more prolonged than in those which received the liver directly.

Before bringing this paper to a close we should like to emphasise certain points.

(*a*) At no time during the four and a half years of these experiments did any of the rats receive food of any kind apart from milk and biscuit; the biscuit was made from English flour and water only. (*b*) No water was given. (*c*) The treated milk was taken from the same bulk as the raw milk. (*d*) The milk used was obtained throughout from the same farm, and was not produced under a Grade A licence. (*e*) The same weights of biscuit were given to all animals, but no attempt was made to give the same quantities of milk. The amounts taken each day were measured, and a slight excess of that taken was offered on each succeeding day. (*f*) The pasteurising was carried out with extreme care under laboratory conditions. (*g*) All animals were caged under similar conditions in galvanised cages, generally made of wire or wire mesh, but occasionally of perforated galvanised sheets. Sterilised wood wool was used as litter. Sterilised sawdust beneath the floors of the cages was not accessible to the rats as all floors were raised, each cage being placed on a separate tray. Dishes used for milk were earthenware.

CONCLUSIONS

(1) Two groups each of 18 rats from seven litters were placed on experimental diets at the age of 21–25 days, receiving raw or heated milk and dry biscuit made of English flour and water only, throughout the experimental period.

(2) Excluding the original rats two generations were raised on each type of milk, the total number of puppies born being 221 from 31 litters of which 47 were weaned on raw milk; 349 from 47 litters of which 56 were weaned on pasteurised milk.

(3) Statistical calculations show no significant difference in the average weights of the rats on different types of milk, but the rats of one group in the third generation (on milk pasteurised in a glass vessel) were abnormally small and very similar in appearance to those which in a previous experiment had received sterilised milk.

(4) Loss of hair, suggestive of a vitamin-B deficiency, was shown by second- and third-generation rats on pasteurised milk, but not by those on raw milk.

(5) Percentage of ash, calcium, and phosphorus in the bones of raw and pasteurised milk-fed rats showed slightly higher values in the former group which were, however, not statistically significant.

(6) Red cells and hæmoglobin content of the blood of rats on raw and pasteurised milk showed statistically significant differences in one group only, in which the hæmoglobin of second-generation does receiving raw milk was very slightly higher than the corresponding group on pasteurised milk.

We were greatly indebted throughout the course of these experiments to the director of the National Institute for Research in Dairying, the late Dr. Stenhouse Williams, for his never-failing interest. Our thanks are due to Prof. S. Pennington for his help in arranging the daily supply of milk, to Dr. Evelyn Sprawson for examination of teeth, to the laboratory attendants, in particular Howard Hallett, and to the rat-house attendants. We should also like to thank Dr. Paul White for his help in the statistical work.

WESTMINSTER HOSPITAL.—Lord Wigram is to be invited to become president of this hospital in succession to the King, who, as Prince of Wales, accepted the office. The building committee had approved the general lay-out of the new main building but the Westminster city council has found it necessary to raise certain objections affecting the height of the building, the balconies overlooking St. John's Gardens and the tower. A final appeal for capital is to be launched in the beginning of November to collect a final sum of £250,000. A memorial lintel is to be erected at the main entrance to the medical school in memory of the late Mr. Wolfe-Barry.

AN INTERNATIONAL DENTAL CONGRESS

(FROM OUR VIENNA CORRESPONDENT)

THE International Dental Federation held its ninth congress in Vienna in the first week of August. For more than two years the executive committee, with Prof. Hans Pichler as chairman, has been busy with preparations for the meeting, which united over 4000 dentists from 45 countries of all the five continents. For the first time, as far as scientific congresses are concerned, a new method of translating the papers and the discussion was used. Expert interpreters were entrusted with the immediate translation into French, English, and German of the spoken word, delivered by the speaker into a microphone. Every seat in the auditorium was fitted with headphones and a switch that enabled the listener to choose any one of the three languages. This arrangement is also used in Geneva for the meetings of the League of Nations, and it worked very satisfactorily in Vienna.

The mornings were devoted to the presentation of papers, and demonstrations—over 300 in all—were given in the afternoons. After the opening ceremony Prof. G. Villain (Paris), the president, presented the gold medals of the Miller prize, the highest award of the federation, to Prof. M. Roy (Paris), Prof. B. Gottlieb (Vienna), and Prof. A. Cieszynski (Lwow, Poland). Of the great number of important papers presented to the congress only a few leading ones can be briefly mentioned here. The entire transactions are reported in two large volumes covering 1600 pages, which were presented to every member of the congress.

The important part played by the endocrine system in the development of the teeth and in the ætiology of alveolar pyorrhœa was emphasised. The correlation between parathyroid function and calcium metabolism, described by Prof. J. Erdheim (Vienna), also belongs to this part of research.

A historic review of the development of dentistry and of its journals was the subject of a number of contributions. It was shown that crown work as well as ebonite dental pieces were introduced to Europe as late as 1864 by Thomas Evans from the United States. The ancient Etrurians, Egyptians, and Phœnicians, however, were expert dentists, who thoroughly understood the art of building up artificial crowns and bridges to save diseased or loose teeth or to do duty for them, as numerous mummies and other archæological discoveries have proved. The reinsertion of extracted teeth was discussed by Dr. Konoupčik (Prague), who prefers to treat pyorrhœa in this way, after disinfecting and cleansing both tooth and socket.

DENTAL CARIES

A whole morning was devoted to the discussion of dental caries. It was pointed out that the *Bacillus acidophilus* is regularly present in carious teeth and in the saliva of persons suffering from caries, but more or less absent in those free from the disease, and it is believed, furthermore, that only sugar can be blamed as promoting this organism; other components, including calcium salts, vitamin D, and phosphorus, are considered to be of little significance. It is becoming very likely, to judge from experiments not yet concluded, that bodies protecting against dental caries are present in the blood, and in the near future immunisation against caries may perhaps be possible. Prof. H. Euler (Breslau) found that fermentation promotes the formation of caries by decalcifying the teeth by means of the lactic acid of the fermentative process. He thought that sugar was detrimental to the teeth, but believed honey to be beneficial owing to its contents of formaldehyde and formic acid. Dr. Weinmann (Vienna) laid great stress on the presence of the so-called "saliva bodies," which contain a proteolytic ferment, and which he believes to be a very important barrier against dental caries.

TEACHING OF DENTISTRY

A special section of the congress discussed the teaching of dentistry. In all countries the authorities desire to make dentistry a fully competent and independent specialty, to which applicants should be admitted only after having had adequate training and examinations. It was mentioned that in Austria the description "dental practitioner" (Zahnarzt) was the first specialist title to be protected by law. The Austrian dental practitioner must have qualified as M.D., and must work for at least two years in a dental clinic, whereupon he is admitted to written and clinical examination. The arrangements in this country are now recognised as a model for all Central European States.

Anæsthesia in dental work was discussed freely by a very large number of members. Many still prefer the old but reliable "gas," but the younger men seem to attach more importance to local anæsthesia, particularly in Central Europe; in fact, Prof. H. Sicher (Vienna) said that nerve-block injections are preferred where the anatomy of the maxilla and mandibula is best known.

Great attention was naturally paid to the papers on the principles of modern treatment of diseased teeth, including the filling of the dental canal. Not only the method of removing the living pulp, but also the conservative treatment has its adherents and opponents. With the discovery of the importance of oral sepsis, extraction was the favourite method, but lately surgeons have taken to conservative treatment of infected roots. The canal is cleared from all its pulp, and this having been done under local anæsthesia as described by Prof. Gottlieb, the canal is packed with a filling containing dentin. This favours regeneration, or rather the re-formation of solid osseous substance in the canal. In gangrenous pulpitis this procedure also seems to give very satisfactory results.

DENTAL CARE OF SCHOOL-CHILDREN

Very interesting papers were presented to the section on the dental care of school-children. Reports from various delegates showed that in nearly all civilised countries this problem is increasing and is receiving considerable attention. Reports from Oslo, for instance, tend to show that in that city 99 per cent. of all examined children suffered from more or less advanced dental caries. In Holland much importance is attached to discourage the habit of thumb-sucking which tends to promote maldevelopment of the jaws. In Palestine investigations amongst children in rural and urban districts were clearly in favour of rural life, which tends to give the children much more appropriate food, sugar and protein being used only in very moderate quantities, with the result that their teeth are much healthier. In Austria, especially in Vienna, dental clinics for school-children were instituted as long ago as 1911. At present there are 18 such clinics here alone, besides 28 in other towns. In the capital nearly 100 per cent. of all school-children were controlled

by these institutions in 1935, and 60 per cent. of them were found to require dental treatment. Nearly all the speakers agreed that dental care should begin soon after the eruption of the first teeth because caries in these tends to be followed by infection of the permanent teeth.

ALVEOLAR PYORRHŒA

The last day was devoted to discussions on alveolar pyorrhœa. Prof. Roy discussed the influence of malposition and strain on the condition of the gingiva. Prof. Entin (Russia) pointed out that many accuse pathological metabolism or endocrine disturbances as causing pyorrhœa. It is a fact that the majority of pyorrhœic patients are in the prime of life, the female sex predominating. He therefore thinks that the condition of the alimentary tract plays a prominent part in producing the disease, and he stressed the fact that the lining of the gums must have a certain excretory function, as proved by the deposit of lead, mercury, or bismuth on the neck of the teeth and the gingiva in patients receiving these substances. Prof. Häupl (Prague) insisted on the effect of general disease in producing pyorrhœa. In some countries and in some races it is more frequent than in others. The tall and the lean are more prone to be attacked by it than the short and the stout. According to Dr. Weinmann endocrine hypofunction may be blamed. Destruction of the sympathetic network of the testicle (Doppler's operation) is said to give excellent results in men. A very great part is played by the formation of tartar accumulating in the pouches and the irritation caused by badly fitting crowns and dental plates. The Vienna school, as Dr. Orban pointed out, holds two factors responsible: inadequate oral hygiene, and disorder of general metabolism.

The congress was concluded by the usual social arrangements, and a committee was appointed to make preparations for the next meeting, to take place in five years' time.

SCOTLAND

(FROM OUR OWN CORRESPONDENT)

AN ORTHOPÆDIC DEPARTMENT

ARRANGEMENTS have been made for the institution of an orthopædic department in the Edinburgh Royal Infirmary. The department will be in charge of Prof. John Fraser, assisted by Mr. Walter Mercer and Mr. William Cochrane. An additional staff of two clinical assistants and a non-resident house surgeon is being appointed. Clinical assistants already on the staff of the hospital will be afforded opportunity to work in the department if they so desire.

The board of management has allocated Ward 2 for this service. It has been reconstructed and equipped in order to bring it into line with the most modern requirements for this branch of surgery.

NATIONAL FITNESS

Presiding over the sixty-second annual congress of the Royal Sanitary Association of Scotland, which opened in Montrose on Sept. 9th, Prof. P. S. Lelean, of the Edinburgh chair of public health, spoke on National Physical Unfitness. His main plea was for better food and more exercise if the nation is to reach a proper standard of fitness. He gave many figures to illustrate the present state of the Scottish population, and put the cost of its physical unfitness, on a conservative estimate, at £25,000,000 per annum. Maternal mortality in Scotland had risen last year to 6 per 1000 births as against 4 per 1000 in England, while infantile mortality was 77 as against 57 in England—although in 1900 the rate in Scotland was 17 less than in England. During 1934–35 in Glasgow 13 out of every 14 school-children were found to be defective in health. For adolescents the most reliable data were to be found among recruiting records, and out of 80,000 applicants last year 2 out of 3 were rejected, the proportion of rejects in Scotland having of late years exceeded that in England. Under the National Insurance Act the records showed the 1¾ million Scots insured had an average of 11 days' sickness during 1934–35. Scotland's death-rate last year rose to 13·2. Prof. Lelean used these figures to show the urgent need of instruction in the art of fitness. Biology and physiology were the primary educational needs, while the nation required some rousing slogan, some prompt action promising immediate results, and involving concentrated attack on the vital bastions of unfitness. Attention to diet and exercise could visibly improve the national physique in a couple of years and restore its dignity within perhaps a couple of generations. Great improvement could be rapidly secured by universal education in dietetics and cookery, while as regards athletics and physical training it seemed to be the other nations, not we, who had learned from the playing fields of Eton.

Speaking on the Environmental Services Mr. A. L. Thomson, chief sanitary inspector of Motherwell and Wishaw, pointed out that fitness implies psychophysical fitness, and not merely fitness in the sense of perfect adaptation to environment. The body-mind problem, he said, nowadays receives closer attention, and with this outlook the upsetting effect of nuisances assumes a wider significance.

HOSPITAL REFORM

Another subject considered by the congress was hospital services, introduced by ex-Bailie Stewart Reid, convener of the Glasgow public health committee. The voluntary hospitals, he thinks, have served their day and generation, and the State and the local authorities should now accept the whole responsibility for the treatment of the non-infectious as well as of the infectious sick. He hopes that in any legislation resulting from the report of the Scottish Health Services Committee it will be recognised that the problem of the voluntary hospital is acute from the standpoint of finance, and that in principle it is wrong to have so many different agencies and authorities catering for the sick; and that a bold policy will be adopted that will establish local authorities, in conjunction with the State, as the sole authority responsible for the complete hospital service of the country.

PARIS

(FROM OUR OWN CORRESPONDENT)

OPHTHALMIA NEONATORUM NO LONGER NOTIFIABLE

THE decree of May 20th, 1936, removing ophthalmia neonatorum from the list of notifiable diseases as from Jan. 1st, 1937, is nothing more than official recognition of what has long been a fait accompli. Ophthalmia neonatorum was added on Nov. 23rd, 1893, to the list of epidemic diseases classified as notifiable in 1892. The law of Feb. 15th, 1902, concerning the protection of the public health, imposed the notification of ophthalmia neonatorum on every doctor, public health official, and midwife learning of such

a case. It was assumed at the time that those most often obliged to notify this disease would be midwives, and it was held by as eminent an authority as Morax that this measure would be doubly beneficial in yielding information about the frequency of the disease and in stressing its importance in the view of midwives. From the outset, however, the law was a dead letter; the implications of the diagnosis and notification of such a disease as ophthalmia neonatorum were such as to convince most doctors and midwives that the discretion of silence was the better part of the valour of notification. What may have been an additional inducement to keep silence was a clause in the law of 1902 enjoining disinfection as an obligatory corollary to the notification of every infectious disease, whatever its nature or origin. Apart from the immediate disinfection of the baby's eyes, what else was there to disinfect? The room? The mother? The father? Faced by such a conundrum, what other choice have sensible French doctors and midwives had than that of a masterly inactivity, saving them from the pitfalls of professional secrecy, libel actions, and all the other troubles awaiting the innocent who does not realise that the law is an ass?

CREMATION

Our dislike of cremation stands revealed in the annual report, just published, of the Société pour la Propagation de l'Incinération founded in 1880. In 1935 the crematorium of Père Lachaise disposed of only 920 bodies. Strasbourg came next with 215, then Marseilles with 143, Lyons with 44, Rouen with 6, and Rheims with 2. The modesty of these figures is a remarkable tribute to the hold of the Roman Catholic Church on France.

MEDICINE AND THE LAW

Two Views of Criminal Abortion

A SENTENCE of eighteen months' hard labour was passed on Sept. 9th at the Central Criminal Court upon a woman, aged 61, who admitted having performed illegal operations upon women for many years. She had stated that she felt she ought to help unmarried girls or married women with large families who could not afford to have more children. It was urged in mitigation of sentence that she charged only a few shillings in these cases. Mr. Justice Greaves-Lord, who imposed a sentence of eighteen months' imprisonment with hard labour, was unimpressed. There might, he observed, be people to whom the defendant's antisocial ideas would appeal; it would appeal more strongly if it were not coupled with the vilest greed imaginable. It was not for people like the defendant to do a thing dangerous to the life of the woman upon whom the operation was performed. "When your counsel pleaded that your motive was to avoid a child being born into a state of misery, I could not help asking myself 'what right has any human being to judge of that, and, in a sense, to take life away?'"

Discharged Convict Posing as Doctor

At Clerkenwell police-court last week William Faulkner pleaded guilty to fraud in the course of which he had been posing (apparently not for the first time) as a doctor. A woman dispenser answered an advertisement in a medical journal and received a reply from Faulkner who added the qualifications "M.R.C.P.S." He offered her a post as dispenser in Persia, adding that he was organising a health service in the East on behalf of the League of Nations. He said that a group of people interested in the movement were meeting at Geneva and he suggested that she should join them; he then obtained £6 from her for alleged accommodation at Budapest. Having given him a cheque for this amount, she received a telegram next day asking if the cheque had been sent; she happened to consult her bank manager who advised her to stop the cheque. The prosecution stated that Faulkner was a discharged convict who had been sentenced to five years' penal servitude for bigamy and false pretences: he had seven other convictions; on one occasion he had practised as a doctor, had carried out electrical treatment, and had operated on the foot of one of the women to whom (as in the dispenser's case) he had proposed marriage. A passport belonging to a doctor was found in his possession. Faulkner had been released from prison last March on a licence which would expire next year. The magistrate at Clerkenwell sentenced him to six months' imprisonment.

PANEL AND CONTRACT PRACTICE

Inspection of Surgeries

FOR many years it has been customary in London, when a practitioner has applied for consent to the employment of an assistant, and in certain other circumstances, to arrange for a representative of the insurance committee in company with the secretary of the panel committee to visit the surgery and see for themselves whether the accommodation and arrangements are satisfactory. Recently the representatives found in two cases that the surgery premises were totally unsuitable for the purposes of an insurance medical practice and as a result the medical benefit subcommittee were instructed to consider the whole question of visitation of surgeries as it was thought that if the premises of one of the doctors in question had been seen at the time he joined the medical list and before he established himself in practice the situation might have been saved. The clerk of the insurance committee was instructed to consult with the secretary of the local medical and panel committee with a view to arranging for the surgery accommodation provided by new applicants for admission to the medical list to be inspected by an officer from each of the two committees in all cases in the London area in which a doctor is not succeeding to an already established practice, and in those cases in which any practitioner proposes to acquire and to practise from other premises. The local medical and panel committee have approved the proposal and a number of visits have already been paid. This experiment in coöperation will be watched with interest.

Cost of Medicines

The Essex insurance committee has been examining the increasing cost of providing medicines for insured persons. In that county 785,915 prescriptions, costing £28,830 were issued in 1923; in 1934 the figures were 1,706,655 and £60,386, an increase in number of 117 per cent. and in cost of 109 per cent. although the insured population of the county had increased by only 66 per cent. The average cost per person for drugs, &c., in 1923 was 30·28*d.* and

in 1935 39·6*d.*, an increase of 31 per cent. The committee proposes to table a notice of motion at the forthcoming meeting of the National Association of Insurance Committees expressing the view that every effort should be made to devise more efficient means for the examination of the orders issued for the supply of medicines, the prevention of waste and extravagance, and for safeguarding the limited funds available for the provision of drugs. Essex wants the association to confer with the Insurance Acts Committee and the National Pharmaceutical Union and to make some representation about it to the Minister of Health. Essex is not alone in finding these increases, for the annual report of the North East England prescription bureau shows that in 1935 4,190,668 prescriptions were issued as compared with 3,410,469 in 1926. But while Hull has an average cost of 14·8*d.* per person for the first quarter of this year, as compared with an average for the area of 11·2*d.*, it is encouraging to find that Nottingham reports that the number of prescriptions issued during 1935 was 3 per cent. below that for 1934, and the cost was £16,876 as compared with £17,263 for that year, despite an increase of some 2500 insured persons who now number 125,733.

An Altered Prescription

Occasionally an insurance prescription is altered, or even entirely written, by someone other than the practitioner by whom it purports to have been issued. Favourite items for increased quantities are dressings and cod-liver oil, while the forgeries are usually the handiwork of drug addicts. The East Ham Committee has recently dealt with a case in which a neurasthenic patient, who had been in receipt of disablement benefit since 1928, altered a prescription by adding words traced from a copy of an earlier prescription. The man was interviewed by the chairman of the medical benefit subcommittee and eventually admitted the offence, alleging that it was the first time and that the reason was that he was in pain. He promised not to repeat the offence and to forward to the committee the tracings he had retained of previous prescriptions, but later said they had been destroyed. The committee wishes to corroborate this story. In another place there has been difficulty with prescriptions forged on forms from a prescription book which was purloined from a doctor's surgery. It might be well to store such books in a place not accessible to patients.

GRAINS AND SCRUPLES

Under this heading appear week by week the unfettered thoughts of doctors in various occupations. Each contributor is responsible for the section for a month; his name can be seen later in the half-yearly index.

FROM A DOCTOR WITHOUT PATIENTS

To a journalist in want of a topic an almanac is a godsend. But a medical journalist who, for the credit of the faculty, consults the almanacs issued by learned corporations is at a stand. In the first week of September the University of Oxford commemorates *Giles* and *Evurtius, Bp. of Orleans.* The University of Cambridge records, more respectfully, *Saint Giles*, but pays no tribute to the bishop. The University of London, faithful to its secular tradition, records neither saint nor bishop, and its warning that on Sept. 1st entry closes for M.S. Branch I. (with thesis), although both professional and literary, is not inspiring. The almanac of the Royal College of Physicians is more helpful. Against the date Sept. 7th we read: *College House, Amen Corner, burnt down in the Great Fire 1666.* Munk has a pleasant account of the "commodious and stately edifice" in Warwick-lane which replaced the ancient building at Amen-corner; he dilates particularly on the lecture theatre, "exquisite in its proportions and imposing in character, and a model 'of acoustical and optical architecture.'"

For 150 years the College abode in Warwick-lane, but "there was the one serious drawback of its situation." It was not fashionable. Munk has a good deal to say about the opening of the new College on June 25th, 1825, when Sir Henry Halford addressed an "audience such as in respect of royalty, nobility, official station, and learning had never before been collected in our College." He records the names and titles of some of those who came and of some who did not. But, curiously enough, he passes over in silence the architectural merits of the building and does not even mention its lecture theatre. Yet the theatre has an intrinsic merit. It was pointed out to me many years ago by a distinguished officer of the college. The little procession was forming; I was to lecture. He whispered: "If you see us nodding, don't be discouraged; it will not necessarily be due to your dullness; the atmosphere of our theatre would be too much for *any* orator." Since the audience at an official lecture usually consists of officers who do not want to hear the lecturer and his personal friends who have heard him only too often, a theatre so constructed as to provide a valid excuse for slumber does credit to its architect. Should the College move again—and really it has very odd neighbours—let us hope that the kindly forethought of Sir Robert Smirke will be had in mind by the future architect.

The best solution of all, of course, would be to take the lectures as read. An exception might be made when a distinguished foreigner is invited, because we may wish to see what he looks like. But then a more imposing auditorium than a mere lecture theatre would be appropriate.

* * *

We recently had "An Examination of Examinations,"[1] some of the results of which may comfort those who must spend this vacation steeling themselves against yet another interview with fallible judges. An examination of lectures might be even more illuminating, but much more difficult. That the same examiner gives different marks to the same script at different times is rather disconcerting—if not wholly unexpected. If the same lecturer never lectures twice in exactly the same way on the same subject, it does not follow that he is a bad lecturer. No doubt we should all agree that a lecturer who cannot keep the attention of his hearers is a failure. But we should certainly not all agree that the lecturers whom we most liked to hear were our best teachers.

We pay very little attention to the art of lecturing nowadays. Some time ago a successful lecturer wrote a book on the subject. He emphasised the fundamental importance of knowing one's subject, but deprecated excessive specialisation. "Look at

[1] London: Macmillan. 1935. A fuller study, entitled "The Marks of Examiners," has just been issued by the same publishers.

the medical profession," he said, "why, in the days of Hippocrates, you did not have some doctors who would only treat medical cases and others who would only practise surgery and others who would only attend to eyes"—he was a lawyer, so naturally his medical illustrations were old-fashioned. He favoured all-round training for the lecturer. That, however, was only the foundation. It might be true—he thought it was true—that abundance of knowledge begot abundance of words, but it did not follow that one should not take a great deal of trouble in the arrangement of one's knowledge and the choice of one's words. The name of this lecturer was Cicero and what he called oratory we call lecturing—viz., speaking after careful preparation of what we intend to say. At least that is what we ought to mean by lecturing. All the good lecturers I have heard—including those who lectured without notes—observed Cicero's rules. The late Prof. Karl Pearson, one of the most brilliant teachers of our generation, usually had full notes on the table at professorial lectures. His popular lectures involved days of preparation. Young gentlemen of our faculty who think, as they sometimes do, that the careful preparation—even the rehearsal before a dog asleep on the hearth-rug—of a lecture to beginners is beneath their dignity, might take a leaf out of K. P.'s book.

* * *

Sir Francis Fremantle, in his Macalister lecture on "The Doctor in Parliament," delivered a few weeks ago, paid us a magnificent compliment. He spoke of the medical man as "naturally a man with a central mind. Feeling might sway him strongly to the left or the right, but his mind and its processes were naturally central. He saw what was sound, reasonable, and sincere on either side." How grand! *Securus judicat*—but I must resist the old-fashioned habit of dropping into tags. Perhaps the electors may apply to us a caution against lawyers offered to the electors of 1694 by the Marquis of Halifax. "If lawyers have great practice, that ought to take them up; if not, it is no great sign of their ability, and at the same time giveth a suspicion that they may be more liable to be tempted." I fear My Lord had in mind quite vulgar temptations, but ours would be to cease being competent doctors without becoming efficient statesmen. As, indeed, Sir Francis made clear, a new member of Parliament has a great deal to learn; and members of our faculty will hardly be ripe for Parliament at an age when learning a new intellectual technique is easy. Middle-aged men cannot expect to compete with success in an eager political assembly; they can hardly help being as Sir Francis put it, "damned as experts." It is surely a pity that we cannot win a foothold in "another place" where discussion is less eager but more expert. The present insuperable objection is that a peerage is a highly coveted "honour" with hereditary implications. Some years ago an eminent historian, Prof. Pollard, pointed out in a letter to the *Times* a way out of the difficulty. According to my recollection, the professor said that in Tudor times persons were added to the House of Peers as Lords of Parliament. They had no titles, they might not even sit continuously, but they had the right to take part in debate on the same terms as the Lords Spiritual and Temporal. I suppose that, snobbishness being invincible, even this mode of access would acquire a social prestige and lead to wire-pulling. Still it might open doors which, as Bagehot said long ago, "are shut against genius that cannot found a family, and ability which has not five thousand a year."

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

Surg. Comdrs. T. C. H. Neil to *President* for course; J. G. Holmes to *Victory* for R.N. Hospital, Haslar; and G. L. Ritchie to *Furious*.

Surg. Lt.-Comdrs. J. Cussen to *Exeter*; F. W. Gayford to *Maine*; L. P. Spero to *Iron Duke*; and J. N. Nicolson to *Victory* for Portsmouth Dockyard.

Surg. Lt.-Comdr. (D) L. V. Donegan to *Resolution* (on commg.).

Surg. Lts. H. J. Bennett to *Drake* for R.N.B.; H. de B. Kempthorne to *President* for course; G. A. Lawson to *Aberdeen*; D. Shute to *Duncan*; and F. H. Ward to *Victory* for R.N.B.

ROYAL NAVAL VOLUNTEER RESERVE

Surg. Lt. J. F. Corr to be Surg. Lt.-Comdr.

Surg. Sub-Lt. R. V. Jones to be Surg. Lt.

Proby. Surg. Lts. A. V. Griffiths, R. R. Prewer, F. J. S. Gowar, P. S. Luffman, and H. J. Wade to be Surg. Lts.

Proby. Surg. Lt. R. M. Littledale to *Neptune*.

Proby. Surg. Sub-Lts. W. S. Parker, G. R. Dodds, and R. P. Phillips to be Surg. Sub-Lts.

ARMY MEDICAL SERVICES

Col. S. W. Kyle (late R.A.M.C.) has been appointed A.D.M.S. on the augmented staff of the 5th Division in Palestine.

ROYAL ARMY MEDICAL CORPS

ARMY DENTAL CORPS

Short Service Commissions: Lt. W. F. O'Carroll to be Capt.

TERRITORIAL ARMY

Capt. A. MacG. Duff, M.C., to be Maj.

Lt. C. G. Roberts, from T.A. Res. of Off. (7th Bn. R.W. Fus.), to be Lt.

ROYAL AIR FORCE

Flight Lts. F. E. Lipscomb and G. W. McAleer promoted to the rank of Squadron Leaders.

Flight Lt. T. W. Wilson to R.A.F. Station, Farnborough, on re-employment on the active list.

Flight Lts. G. W. Paton and R. G. James to R.A.F. Depôt, Middle East, Aboukir, Egypt.

Flying Offr. F. L. Whitehead to No. 8 Flying Training School, Montrose, instead of to No. 9 Flying Training School, Thornaby, as previously notified.

Flying Offr. H. C. de B. Milne to No. 8 (B) Squadron, Aden.

Dental Branch.—Flying Offr. L. C. Bellsham-Revell ceases to be seconded to Guy's Hospital.

RESERVE OF AIR FORCE OFFICERS

Flight Lt. A. T. G. Thomas is granted a commission in that rank, in Class D, on relinquishing his commission in the Auxiliary Air Force—No. 604 (County of Middlesex) (Fighter) Squadron.

Flying Offr. T. A. Hunt is promoted to the rank of Flight-Lt.

INDIAN MEDICAL SERVICE

Capt. A. W. West, of the Indian Medical Service, has been appointed Deputy Public Health Commissioner with the Government of India.

Brevet-Col. A. A. C. McNeill has been appointed at Simla as Officiating Deputy-Director of Medical Services during the leave of Col. F. D. G. Howell, D.S.O., M.C., K.H.S.

DEATHS IN THE SERVICES

Colonel CHARLES JOHN WILLMER TATHAM, O.B.E. whose death in his seventy-sixth year is announced, was born at Dallington, Sussex, and qualified M.R.C.S. Eng. from King's College Hospital in 1883 and L.S.A. in 1884. Two years later he entered the R.A.M.C., became major

in 1898, and took part in the South African War from 1899–1902, directing the embarkation of the invalid troops. During the European War he was re-employed from August, 1914, as assistant director of medical services, Northern Command, when he was awarded the O.B.E. After retirement he lived at Long Melford, Suffolk.

Surg. Capt. ALEXANDER KENNETH SMITH-SHAND, R.N. (retd.), was born at Aberdeen in 1876, the son of Dr. J. W. F. Smith-Shand, and was educated at Glenalmond and Edinburgh University, qualifying M.B., Ch.B. in 1900. Two years later he joined the Navy and held positions as staff surgeon to the Royal Marine Infirmary, Deal, and anæsthetist and radiographer at the R.N. Hospital, Haslar. From 1914–18 he was in charge of radiography and of the massage and electrotherapeutic department at the R.N. Hospital, Chatham, and contributed an article on radiology and physicotherapeutics to the Naval Medical History of the War. From 1922–24 he was senior officer to the R.N. Hospital, South Queensferry, N.B.; then assistant to the Medical Director-General of the Navy. After retirement he went to York in charge of the massage and electrotherapeutic department at the county hospital there. Capt. Smith-Shand was a man of great administrative ability, combined with zeal and sound judgment.

OBITUARY

PROF. JULIUS TANDLER

THE news reaches us that Prof. Julius Tandler has succumbed in Moscow to an attack of apoplexy. We owe the following estimate of him and his work to our Vienna correspondent.

Prof. Tandler was born in Iglau (near Vienna) in 1869, and came to Vienna when a boy to receive elementary and secondary education before entering the University. Here he graduated as M.D. in 1895, and made his mark in the study of normal anatomy, being appointed demonstrator at the Anatomical Institute, and later the chief of this institute. Prof. E. Zuckerkandl, a recognised authority in this branch of study, testified to Tandler's value as a collaborator, and Tandler was appointed a lecturer on anatomy (docent) in 1899, and became professor in 1903. When Zuckerkandl fell ill in 1907, Tandler was made his locum tenens, and in 1910 his successor. In this position he worked until 1932, but he was now devoting most of his time to the problems of public health, having become in 1919 Under-Secretary of State for Health in the Socialist Government. Tandler came from a poor family, and understood well the needs of the class from which he sprung. He was not a politician, as he often declared; but he felt that after the ravages of the war it was the paramount duty and task of the State to take care of the needy, to care for the health of its citizens, and to safeguard the upbringing of a healthy stock, otherwise the depopulation of Austria in general, and Vienna especially, was inevitable. Here was the key to all the "political" work, which is for ever connected with Tandler's name, and he completed his work by making Vienna one of the healthiest cities on the continent.

In 1919 Prof. Tandler was put at the head of the Municipal Board of Health (besides holding the post of Under-Secretary of State for Health) and he placed the board on a completely new basis. His care for the infant was unremitting. Before the birth welfare care was extended to pregnant women, in special institutions advice was given, and help in money and foodstuffs granted where necessary to expectant mothers. A number of nurses were detailed to follow up cases, and controlled the care and upbringing of the infants who were registered in these institutions. Every new-born child was entitled to *a free* and suitable outfit of clothing. A large institute for children (*Kinder-Aufnahms-Anstalt*) distributed the clothing to hospitals, sanatoriums, and health resorts. A system of school doctors was organised on new lines and school dental clinics instituted, and the child on leaving school was advised by qualified persons as to the occupation for which it was best fitted. Tuberculosis cases were cared for, and obtained advice and help in centres not only in Vienna but distributed through the country, and supplemented by "follow-up" nurses. In the meantime the erection of suitable dwellings by the municipality assisted in the eradication of the disease. The slum clearing and healthy housing, proved by the erection of some 50,000 new dwellings and flats by the Socialist municipality from 1919–1934, are in a high degree owing to Tandler's energetic endeavours. Furthermore, open-air sports, gymnastics, swimming pools for children in the public gardens were freely favoured and made possible by Tandler's work. Cancer treatment on a large scale was promoted by a grant of 5 grammes of radium, which was collected—under Tandler's auspices—for the municipal hospital.

With the knowledge of Tandler's work in the organisation of the Vienna Health Department, the Chinese Government sought his assistance on the same lines, the boards of health of that country in Shanghai, Canton, and Peking extending the invitation. Tandler followed the call, perhaps with the greater pleasure that he had met with a certain amount of opposition in the ranks of the Socialist leaders in Austria, and himself objected to certain aims of his political friends. He was absent from Austria when the Socialists were overthrown, but returned a few months later to find that he had to resign his post as lecturer on anatomy, but no proceedings were set in action against him politically. He accepted now a call from Russia to lecture on public health, after which he made a tour through China, and finally was appointed chief of the Board of Health in Moscow, and entrusted with the task of building up this board on the Vienna and China model a few months ago. In the midst of this work Tandler, who abhorred every political terror, died. His embalmed body will be brought to Vienna to be cremated, Russia desiring to pay the costs.

Julius Tandler's lifework has two aspects; that of the pure man of science and that of the energetic and philanthropic reformer. His scientific work is well represented in his literary output. Over 20 years ago he published a short book on the topographical anatomy of the female pelvic organs. This was followed by a treatise on the topographical anatomy concerned in urgent operations. He wrote manuals on the topography of brain surgery, the anatomy of teeth, and cardiac embryology, and in 1929 published a system of anatomy which ran through several editions. He wrote also a work entitled "Biological Factors of Secondary Genital Features" for which he was awarded a gold medal by the Biological Society of Austria. The other aspect of Tandler's lifework is illustrated by this obituary memoir. He was responsible for the existence and the work of the welfare centres in Vienna which have contributed immensely to the public health of the city and the country, and both in China and Russia he will long be remembered as a sanitary reformer.

ARTHUR STARKIE PLANT, M.C., M.R.C.S. Eng.

THE death occurred through a motor accident on August 22nd of Dr. Arthur Plant, venereal diseases medical officer to the county borough of Grimsby. The son of Mr. H. A. E. Plant, of Poulton-le-Fylde, near Blackpool, he received his education at the Kirkham Grammar School and the University of Manchester. He qualified as M.R.C.S. Eng., L.R.C.P. Lond. in 1913, and shortly afterwards obeyed the call to join the Army. He was attached as captain, R.A.M.C., to the R.F.A. Brigade on the Western Front, and was for a time specialist in venereal diseases to the Western Command in the South Western Area. He did excellent service and obtained the Military Cross. He was appointed consultant venereal diseases medical officer to the Lincoln City and Lindsey county councils, and since 1924 was pathologist as well as V.D. medical officer to the county borough of Grimsby.

We have received the following tribute from his colleague, Dr. J. M. Vine, tuberculosis officer to the borough of Grimsby: "The accident which brought about the untimely death of Arthur Plant will be deplored by many in the north of Lincolnshire. A member of the Grimsby public health staff, he specialised in venereal disease and had marked success in the administration of a busy clinic, which he brought to a very high pitch of efficiency. He had the wider outlook on his work and was active in propaganda and instruction, and his own strong personality was a powerful factor in the ability with which he handled his specialty. He was a man of few words, but his directness and the matter-of-fact attitude which he employed towards his patients won for him that confidence and respect which is of such vital importance in the class of work to which he devoted himself. He was a keen cricketer and played regularly with the Brocklesby Park team where his sparkling and stylish batting won him considerable local fame. But apart from his work he will be remembered by the people of Grimsby as the co-founder with his late wife of a free animal clinic under the auspices of the R.S.P.C.A. where the sick and halt among the four-footed pets of the poor received skilled professional attention."

WILLIAM JOSEPH DEIGHAN, M.B. N.U.I., M.R.C.P.I.

Dr. William Joseph Deighan received his medical training at the schools of surgery attached to the Royal College of Surgeons in Ireland and qualified with the double Irish diploma in 1906, proceeding later to the degrees of M.B., B.Ch., B.A.O. N.U.I. He served as house surgeon at the Jervis-street Hospital, Dublin, did some post-graduate work in Paris, and was practising at Harlesden at the outbreak of war. He served during the war with the R.A.M.C., where his hard experiences left a permanent impression upon his health. At the close of hostilities he worked for some time with the Ministry of Pensions, and ten years ago went into practice at West Hampstead. He was only 56 at the time of his death.

WILLIAM ALFRED GRIGGS, M.R.C.S. Eng.

THE recent death is announced from Brighton of Dr. W. A. Griggs, who was the son of a Ramsgate doctor. He received his medical training at St. Bartholomew's Hospital where he qualified with the English double qualifications in 1884. He worked first at Bournemouth and Leicester, but for the last 20 years had taken up residence in Brighton. He was an early student of radiology and for a period was radiologist to the Brighton and Hove Dental Hospital, while outside his strictly professional work he was a student of psychology in relation to the mystic, and at Sunday afternoon services gave addresses regularly on the occult aspects of life. He was 74 years of age and practised until he succumbed in a nursing-home to pneumonia.

REGINALD CECIL GLOVER, L.M.S.S.A.

THE death of Dr. R. C. Glover occurred on Sept. 3rd, from pneumonia, at Cowark, near Clitheroe, Yorkshire. He was the second son of the late Rev. J. B. Glover of Laisterdyke and Sheffield. After taking his degree at Cambridge, he qualified from St. Bartholomew's Hospital in 1926, when he joined his sister, Dr. Violet Glover, in practice at Bradford. There he was medical officer and officer-in-charge of transport to St. John Ambulance, medical officer to the special constabulary and flying squad, and medical referee for various assurance companies. A prominent freemason, he was also a freeman of the City of London. After three years' practice in Bradford he went to Southport, and had only recently moved to Clitheroe when he contracted the fatal illness which closed his life at the age of 41.

HERBERT GEORGE CLITHEROW, M.R.C.S.Eng.

Dr. H. G. Clitherow who had retired from medical practice for ten years was the son of the late Mr. W. S. Clitherow of Horncastle, and member of a well-known legal family in Lincolnshire. He obtained his medical diplomas in 1901 as a student at the London Hospital and went immediately into partnership with an uncle in Dulwich Village. This was an extensive south-east London practice and Clitherow worked excellently there for 30 years. Unfitted for service abroad because of his health, he did much special work in connexion with the Belgian refugees and the value of his work was recognised in this connexion by the Belgian Doctors' and Pharmacists' Relief Fund. The depletion of medical men on war service proved a heavy strain on Clitherow's physical resources, and in 1926 he retired to Somerton, Suffolk, where despite his delicate health he took an active part in county and municipal administration. He became a member of the Melford rural district council and later chairman of the public health committee, and was active in inquiries into the milk-supply of the district and into the water schemes which were then on the tapis. He became a member of the West Suffolk county council and served on important committees in connexion with public health, housing, and maternity and child welfare. His retirement from his London practice had led to general expressions of regret in the community in which he had worked, and a similar tribute to his qualities was paid at the funeral service in his memory held at Somerton.

WATH WOOD ISOLATION HOSPITAL, SHEFFIELD.—Alterations and additions to this institution are in hand and cubicle blocks are being erected to avoid cross-infection. The total cost will be in the neighbourhood of £17,000.

EAST SUFFOLK AND IPSWICH HOSPITAL.—A sum of £14,000 has been spent on the modernisation and enlargement of the out-patients' department at this hospital, to which very little had been added since 1913. A new dental clinic has been opened and the casualty department, where 128,858 cases were treated in 1935, as against 15,292 in 1913, has also been reconstructed.

RHEUMATISM

AN INTERNATIONAL CONGRESS IN SWEDEN

At the invitation of the Swedish Committee on Rheumatism, whose secretary is Dr. G. KAHLMETER, the fifth biennial congress of the International League against Rheumatism was held in Lund and Stockholm from Sept. 3rd to 8th. Members from many countries met at Lund under the presidency of Prof. SVEN INGVAR, and a large proportion went on to Stockholm where the congress concluded in the presence of Prince CHARLES OF SWEDEN, its honorary president.

ALLERGY AND ARTHRITIS

In a discussion on allergy in rheumatic diseases some of the speakers, including Dr. JOHN FREEMAN (London) and Prof. G. MOURIQUAND (Lyons), maintained that neither rheumatic fever nor rheumatism can be attributed to allergy, though allergic conditions can be observed in infective cases. Others, however, regarded allergy as definitely causal. Thus Prof. F. KLINGE (Münster) found more and more reason to suppose that rheumatism depends upon damage to mesenchymatous tissues by allergic reaction to various kinds of antigens. Prof. RÖSSLE (Berlin) held that the morphological equivalents of allergy (anaphylaxis) vary with the tissues and organs affected; in the smooth muscle-fibre there was cramp, in the mesenchyma there was chronic inflammation with local proliferation. In the specific infections also there were granulomata with cutaneous and focal reactions. Non-specific focal and diffuse inflammations likewise played a part in allergic disease—the nature of the inflammation being the same whatever the allergen. Their biological function was to localise dangerous toxins. Prof. V. TALALAJEFF (Moscow) said that an allergic state preceded the onset of the disease, which was thus "secondary," a previous illness commonly producing sensitisation. Rheumatic fever could be regarded as of allergic-infective origin, infection being the exciting cause. Dr. ANTON FISCHER (Budapest) thought that the allergic nature of rheumatism was not proven; but both the course of rheumatic fever and the connexion between chronic rheumatism and weather reminded one of allergic conditions. Dr. F. GUDZENT (Berlin) pointed out that both rheumatism and gout occurred in families liable to allergic diseases. Of his rheumatic and gouty patients, 35 per cent. reacted to animal albumins and 55 per cent. to vegetable albumins. All rheumatic conditions were, he believed, due to an inherited or acquired hyperergic reaction to foreign albumins. Dr. CAUTERMAN (Antwerp) supported the theory of an allergic condition in chronic non-infective rheumatism.

RADIOGRAPHY.—MYALGIA

Dr. BASTOS ANSART (Madrid) and others spoke of common errors of diagnosis in the radiography of arthritis and the wide divergence observed between the X ray appearance and the functional state of the joints. Prof. ROCHLIN (Leningrad) showed that a great variety of ætiological factors, including normal degenerative processes, might produce similar X ray appearances. Drs. WEISSENBACH and FRANÇON (France) found that photographs in series were not only good documentary records but assisted the differentiation of arthritis. Dr. G. VAN DAM (Amsterdam) exhibited some interesting pictures of "infective arthritis" in the hand, showing in early cases a transverse contraction, also a destruction of bone under the cartilage of the heads of the metacarpal bones.

Prof. SVEN INGVAR (Lund) regards sciatica not as a neuritis but as a myalgia due to trauma and associated with circulatory disturbance. It has often been recognised in sciatica that the affected limb is colder than its fellow (by 1–2° C. or more), and Prof. Ingvar has found that normal temperatures can usually be restored by artificial hyperæmia as well as by vasodilator drugs such as caffeine. Pyrifer (*coli* vaccine) has also proved helpful in obstinate cases by raising the general body temperature, as in severe cases of neuralgia. Physical treatment is usually vasodilator. Prof. JULIUS ROTHER (Berlin) called attention to the importance in many myalgias of disturbances in blood circulation and body heat, brought about by repeated exposure to cold. This led in time to a general defect in heat regulation. Other cases are mainly caused by mechanical and static abnormalities. The choice of pathological theory had a considerable bearing upon treatment. Dr. C. VOLTA (Barcelona), like others, took similar views. Myalgia, he said, signified clinically pain, muscular contraction, and palpable infiltrations and nodules, and was brought about by disturbances of blood circulation in the muscles. Toxic and bacterial poisons might be contributory causes. Dr. ERNST FREUND (Vienna) spoke of the many factors of causation—in addition to possible infection, metabolic abnormalities, fatigue, strain, trauma, and chill—producing a variety of tissue changes. Dr. J. B. BURT (Bath) called attention to the special liabilities of muscles acting in a confined space. For example, the conditions sometimes diagnosed as neuritis in the arm are, he believes, due to myalgia or myositis in the supra- or infra-spinalis muscles, which are confined between the scapula and a dense fascia. The same trouble in the gluteus medius might set up pain in the leg. The inflamed muscle pressed upon the subjacent nerve. In such cases the affected muscle would be found to be tender and should be treated with heat and massage.

"ORTHOPÆDIC" TREATMENT OF ARTHRITIS

The adjective "orthopædic" is now made to cover many simple preventive measures in the treatment of arthritis. The discussions revealed uncertainty about the proper balance between immobility and exercise, and emphasis was laid on the danger that routine treatment may aggravate the disease, especially in the inflammatory phase. Many speakers, like Dr. WEISSENBACH and Prof. P. MATHIEU (Paris) strongly urged the study of posture in the earliest stages of the disease and the systematic prevention of deformity by means of plaster bandages and splints. Dr. LORING T. SWAIM (Boston, U.S.A.) had developed an effective and ingenious system at the Brigham Hospital in Boston. The methods were demonstrated in a series of pictures. As a rule complete immobilisation of an arthritic joint or joints is practised at the earliest possible stage. This overcomes the injurious flexor spasm and gives the inflammation a chance of subsiding. "Deformities are not allowed to occur." Later, when it is safe to release the joints during the daytime they are splinted every night, to prevent the risk of spastic contraction during sleep. The same applies to arthritic flexion of the spine, the supports being used until active disease has subsided. During convalescence braces and exercises of various kinds restore the joint functions and keep the posture normal.

THE CAMPAIGN AGAINST RHEUMATISM

At the opening of the Congress Mr. LEVINSON, director-general of the Swedish board of pensions, described the organisation for the care of rheumatic patients in Sweden, and Mr. STRINDLUND, the Home Secretary, conveyed the good wishes of the Government. Dr. FORTESCUE FOX (president of the League) referred to the two significant motives by which the League had been inspired since its foundation—the medical and the social. At the Stockholm meeting Dr. F. J. POYNTON (London) with Dr. GUNNAR EDSTRÖM (Sweden) and Prof. G. DANISCHEVSKY (Moscow) were appointed to a committee of inquiry into the influence of climatic and meteorological conditions on rheumatism.

The next international congress of the League is to be held in England in April, 1938. The hon. secretary is Dr. J. van Breemen of Amsterdam.

PUBLIC HEALTH

Caravans on the River

HOUSING shortage and economic conditions have given rise to a situation on the lower Thames somewhat comparable to the aggregation of caravan dwellings on land. Houseboats on the Leigh creek began to be a nuisance 15 years ago when there were not more than 18 of them; now there are 140 on this creek alone and more than 300 in the Port of London area. The houseboats may consist of anything from lifeboats, naval cutters, and bawley boats to barges and lighters with some sort of wooden superstructure to make them habitable. They are mainly moored between high and low tide mark and mostly unseaworthy. The occupier may pay rent for the boat and a small sum to the owners of the foreshore but contributes nothing to the social services of the locality. On the contrary he simply throws sewage and refuse overboard to mix with the river mud. In 1923 the Port sanitary authority obtained power to apply by-laws to houseboats as if they were tents or vans but was not authorised to lay down standards of decent living or ventilation. In 1933 however further powers were obtained jointly by the Port authority and the sanitary authority and a set of by-laws drawn up jointly appeared this month in the *Times*. All houseboats must now be registered annually, notice being given of transfer, sale, or change of tenancy. No houseboat may be moored within 100 ft. of any other or beyond reasonable distance from a supply of wholesome drinking water. The minimum free air space for each occupant is defined. Windows must be at least one-tenth of the floor area and open to a third or more of their extent, apart from permanent ventilation by inlet and outlet openings of prescribed size. No solid or liquid refuse may be deposited on the foreshore. The owner must maintain the houseboat reasonably weatherproof and the occupier must keep it clean. These by-laws should enable effective control to be exercised.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED SEPT. 5TH, 1936

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 0; scarlet fever, 1439; diphtheria, 941; enteric fever, 319; pneumonia (primary or influenzal), 355; puerperal fever, 30; puerperal pyrexia, 120; cerebrospinal fever, 9; acute poliomyelitis, 14; acute polioencephalitis, 1; encephalitis lethargica, 5; dysentery, 14; ophthalmia neonatorum, 84. No case of cholera, plague, or typhus fever was notified during the week.

Of the 319 notifications of enteric fever the county of London provided 19 (Bermondsey 6), Southampton 108 (Bournemouth 97), Dorset 60 (Poole 54), Durham 18 (Sedgefield R.D. 14), and Warwick 17 (Birmingham 11).

The number of cases in the Infectious Hospitals of the London County Council on Sept. 11th was 2673, which included: Scarlet fever, 803; diphtheria, 761; measles, 119; whooping-cough, 402; puerperal fever, 9 mothers (plus 3 babies); encephalitis lethargica, 285; poliomyelitis, 1. At St. Margaret's Hospital there were 14 babies (plus 6 mothers) with ophthalmia neonatorum.

Deaths.—In 122 great towns, including London, there was no death from small-pox, 18 (4) from enteric fever, 6 (1) from measles, 3 (0) from scarlet fever, 16 (2) from whooping-cough, 37 (2) from diphtheria, 48 (8) from diarrhœa and enteritis under two years, and 6 (0) from influenza. The figures in parentheses are those for London itself.

The deaths from enteric fever outside London occurred at Bournemouth 7, Poole 2, Croydon, Leyton, Southampton, Manchester, and Cardiff each 1.

The number of stillbirths notified during the week was 250 (corresponding to a rate of 39 per 1000 total births), including 38 in London.

NATIONAL FITNESS.—Opening an Empire health exhibition at Portsmouth on Monday last, Sir Kingsley Wood, the Minister of Health, said: "We want a fitter Britain. There should be a much more systematic development of the facilities for physical recreation and exercise in this country. People are living longer by some fifteen years than their forefathers. We must make sure that our longer years are worth living, and life to be worth living must be healthy and vigorous." He spoke of the steady growth of public open spaces and modern town and country planning as two of the best signs of the time. Some millions were spent last year on recreation grounds and swimming pools, and much more than in previous years. All these things helped to bring about that cult of bodily fitness which was in the interests of a healthy race and could be profitably extended in this country.

CORRESPONDENCE

THE OXFORD GROUP AND THE MEDICAL PROFESSION

To the Editor of THE LANCET

SIR,—As a profession, we are cautious and adopt a conservative attitude to "movements" or anything that appears to be outside our time-honoured methods. In these days of world perplexity and chaos, however, no one can afford to leave any stone unturned that may open up a path leading to peace and security. Our responsibility in helping to form a constructive public opinion is enormous, and is equalled only by our opportunities of so doing.

The Oxford Group is rediscovering the teachings of Christ and interpreting them in the language of the modern day. Its purpose is to remake the world under the guidance of God, through the changing of human nature. There could be nothing finer than mobilising our knowledge of natural law, medicine, and of men and women for this task. I have recently come into contact with the movement, both personally and through certain patients. With regard to the latter, a striking difference in their mental and physical health has been noticed, and I have seen how human nature can be changed.

Medical men will be coming increasingly into contact with the Oxford Group and will therefore have opportunity for examining its programme. May I make a plea for honest investigation and inquiry into this movement, which is undoubtedly affecting the lives of an increasing number of responsible individuals, by the usual scientific approach—namely, observation and experiment. Some of us are making for ourselves what is surely the greatest experiment of all time, and discovering the reality of Divine Will in everyday life. The results are, to say the least, more than interesting; by the application of the basic principles of Christianity personal freedom and confidence, increased efficiency, and a different type of work is produced. From this grows a new vision of the purpose of medicine—namely, that the treatment of the whole of man's threefold nature, rather than concentration on the physical aspect, is the secret of real health.

I enclose a copy of the recent publication *Drums of Peace*. This magazine can be used as a starting-point for information, and is a valuable addition to the waiting-room literature. My secretary tells me that the copies in my own waiting-room are used more than any other magazine. It is obtainable through W. H. Smith and Son's bookstalls.

I am, Sir, yours faithfully,

Folkestone, Sept. 9th. E. E. CLAXTON.

IMPAIRED GLUCOSE TOLERANCE IN ALIMENTARY DISORDERS OF CHILDHOOD

To the Editor of THE LANCET

SIR,—The paper of Dr. Wallace Ross on this subject in your issue of Sept. 5th was of great interest to me. During an extensive study of an endemic parotid enlargement (hyperplasia) in Egypt, under the supervision of Prof. H. B. Day, but not yet published, I found similar abnormalities in the oral glucose-tolerance curves (usually a flat type), yet the intravenous glucose-tolerance curves were quite normal. Our aim in doing these tests was to separate our endemic hyperplasia from another type described by Flaum [1] in latent diabetes. We found that the commonest disease associated with parotid hyperplasia in Egypt is pellagra, and we ruled out the claimed relationship between this condition and ankylostomiasis. Therefore the glucose tolerance was done on pellagra cases, either pure or complicated by parasitic infection, which is not necessarily ankylostoma. All the patients were adults, diarrhœa was present, but slight, in some, and the gastric acidity was variable; but the findings were the same in all. Similar glucose-tolerance tests were done by another worker, P. Ghalioungi (personal communication), who worked on selected cases of ankylostoma anæmia only, and identical results were obtained. I did control tests on patients of the same class as those having the parotids (farmers), but with no parotid enlargement; similar curves were obtained when there was pellagra, diarrhœa, or parasitic infestations. The conclusion was drawn that parotid enlargement in no way modifies the carbohydrate tolerance. The factor at play is diminished absorption from the alimentary canal either due to atrophic changes, parasite infection or diarrhœa. The normal glucose-tolerance curves done by the intravenous route exclude any disturbance in the regulation of the blood-sugar.

The types of curves were: (*a*) a flat type, (*b*) a flat delayed type, or (*c*) a climbing type, which is common in cases complicated with cirrhosis of the liver (bilharzial) either early or advanced. These were obtained by the oral glucose-tolerance test (G.T.). (The intravenous test gave normal curves.) The following are examples:—

FLAT TYPE

	Fasting.	*30*	*60*	*90*	*120 min.*
Oral G.T.	85	95	100	105	98

(Mg. per 100 c.cm.)

	Fasting.	*15*	*30*	*45*	*60*	*90*	*120 min.*
Intravenous G.T.	92	174	152	104	90	85	86

(Mg. per 100 c.cm.)

FLAT DELAYED TYPE

	Fasting.	*15*	*30*	*45*	*60*	*90*	*120 min.*
Oral G.T.	85	98	108	114	136	118	113
Intravenous G.T.	80	154	125	100	92	86	—

(Mg. per 100 c.cm.)

CLIMBING TYPE (FLAT)

	Fasting.	*30*	*60*	*90*	*120 min.*
Oral G.T.	80	98	108	120	135

(Mg. per 100 c.cm.)

	Fasting.	*15*	*30*	*45*	*60*	*90*	*120 min.*
Intravenous G.T.	105	210	185	142	130	102	—

(Mg. per 100 c.cm.)

I should like to mention a case which gave findings opposite to those of Dr. Ross. The patient, a woman aged 35, has neither pellagra nor obesity and no parasitic infection, but a low gastric acidity and enlargement of the parotid glands. The oral glucose tolerance was diminished while the intravenous glucose tolerance was normal. The tests were repeated twice with constant results. The following were her figures:—

	Fasting.	*15*	*30*	*45*	*60*	*90*	*120 min.*
Oral G.T.	85	—	146	—	165	186	152
Intravenous G.T.	82	153	133	95	88	80	—

(Mg. per 100 c.cm.)

Even after spontaneous regression of her parotid enlargement the findings remained the same. Could this be a case of latent diabetes, but with a better sensitivity for non-absorbed (i.e., intravenous) glucose?

I have mentioned that the responsible factor for these abnormalities in the oral glucose-tolerance

[1] Flaum, E.: Klin. Woch., 1932, xi., 1704.

curves is probably the diminished absorption. The interesting findings characterising our cases is the normal intravenous glucose-tolerance curve in contrast to the high intravenous curve (diminished tolerance) in Dr. Ross's cases. It is well known that in pellagra the same factor of lack of absorption of carbohydrates exists as it does in his cases. Therefore, the explanation of his high intravenous curves on a lack of absorption of carbohydrates only seems unjustifiable. The improvement after the administration of liver stands against this explanation. The improvement of the glucose tolerance after treatment with glucose is expected even in diabetics.[2] I think liver treatment should be tried in the insulin-insensitive diabetics.

I am, Sir, yours faithfully,

M. R. KENAWY,
Registrar to the Medical Unit,
Kasr-el-Aini Hospital.

...INA PECTORIS

...itor of THE LANCET

...much interest the comprehensive ..., by my colleague, Dr. Parsons-...wing one by Dr. Geoffrey Bourne ...pt. 5th. I would like to supple-...ef notes of a shell-shock case which ...mptoms of angina of a severe type ...ied to suggestion after the failure of ...tment.

A soldier about 30 years of age was admitted to the Heart Hospital under my care with severe anginal symptoms, the cause of which repeated examinations failed to discover; moreover, treatment gave but temporary relief. The symptoms were provoked by any attempt to get out of bed or even turn over.

As the patient was getting worse rather than better and there was a neurotic element present, it was at length resolved to try the effect of suggestion. The male ward is on the top floor and above is a roof garden. I said there was only one remedy left, but that must have his coöperation to be effective. On the following morning he was to have a subcutaneous injection after which he was to go up to the garden. The nurse was to cleanse the arm in the evening and again in the morning, leaving a dressing on until I came. ℥ xv of distilled water was injected and immediately afterwards he walked upstairs leaning on my arm. The treatment was successful and after two further weeks in the hospital he returned home to complete recovery.

Although I have had several cases of pseudo-angina such an extreme one is unique in my experience.—I am, Sir, yours faithfully,

CHARLES W. CHAPMAN,
Consulting Physician, National Hospital for Diseases of the Heart.

Sept. 15th.

PERMEABILITY OF THE SKIN

To the Editor of THE LANCET

SIR,—The annotation in your last issue draws attention once more to the therapeutic possibilities of absorption through the skin. According to Filehne, the skin is to be conceived as a "diffusion membrane," impregnated with cholesterin and coated on its external surface with fat and skin grease. Only such substances can diffuse through it as dissolve in the fluids which impregnate and coat the "diffusion membrane," or are capable of uniting with them. Modern spa treatment finds its scientific justification chiefly in the new conception of the biological function of the skin, which is no longer conceived simply as an integument, but as an active organ which influences vegetative processes through hormones and exchange of mineral substances. The influence of baths on a big surface with a close capillary network makes the favourable therapeutic results seem explicable. In Budapest, which possesses a number of natural warm springs, the medical profession has been taking much interest in the therapeutic principles involved, especially in relation to rheumatism, which is very widespread in Hungary, and lately we have had especially good experience with salicylic mud-baths. H. Kionka has pointed out that in addition to purely physical stimulation by substances dissolved in the mud-bath there are chemical effects on the body. The mud used contains a mixture of vegetable acids in colloidal form, and in the Salhumin bath, which has lately been introduced into England under the name of Husalba, a successful attempt has been made to render these acids water-soluble so that they can exert their full influence on the body. Many years' experience has shown the usefulness of such baths in acute and chronic rheumatic infections.

I am, Sir, yours faithfully,

DR. ALEX. FORBATH,
Editor of *Magyar Orvos*, Budapest.

London, Sept. 14th.

MUSTARD PACKS

To the Editor of THE LANCET

SIR,—In the review of the book on "Hydrotherapy," by R. M. Le Quesne and M. Granville, which appeared in THE LANCET for August 8th last (p. 353), the following criticism is made:—

> The statement that excessive heat prevents the liberation of the volatile oil in the preparation of mustard packs is erroneous; on the contrary, the oil is set free by excessive heat and may thus cause blistering.

From the facts available, there is no doubt that the authors of the book are correct and the reviewer is wrong. The volatile oil of mustard (allyl isothiocyonate) is produced when the enzyme myrosin reacts with the glucoside sinigrin, both compounds being normal constituents of mustard, but interacting only when water is present. Myrosin, in common with all other enzymes, is unstable towards heat, and since its presence is necessary before volatile oil can be produced, it follows that the existence of the latter depends on the temperature of the water being below that at which myrosin is destroyed—in other words, *not* excessively hot.

No definite temperature can be given at which mustard is completely "killed," but experiments have repeatedly shown that from 140° F. (60° C.) onwards, the amount of oil liberated rapidly decreases, becoming negligible as boiling-point is approached. In a bath there is not very much likelihood of the water reaching such temperature, but in the preparation of a mustard pack it is quite possible that water just "off the boil" might be used, with fatal results to the mustard. The authors' warning, therefore, seems to us not only scientifically correct but well justified.—I am, Sir, yours faithfully,

JOHN W. CORRAN,
Chief Chemist, J. and J. Colman Limited.

Norwich, Sept. 14th.

[2] Ellis, A. W. M.: Quart. Jour. Med., 1934, iii., 137.

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CORRESPONDENCE

THE OXFORD GROUP AND THE MEDICAL PROFESSION

To the Editor of THE LANCET

SIR,—As a profession, we are cautious and adopt a conservative attitude to "movements" or anything that appears to be outside our time-honoured methods. In these days of world perplexity and chaos, however, no one can afford to leave any stone unturned that may open up a path leading to peace and security. Our responsibility in helping to form a constructive public opinion is enormous, and is equalled only by our opportunities of so doing.

The Oxford Group is rediscovering the teachings of Christ and interpreting them in the language of the modern day. Its purpose is to remake the world under the guidance of God, through the changing of human nature. There could be nothing finer than mobilising our knowledge of natural law, medicine, and of men and women for this task. I have recently come into contact with the movement, both personally and through certain patients. With regard to the latter, a striking difference in their mental and physical health has been noticed, and I have seen how human nature can be changed.

Medical men will be coming increasingly into contact with the Oxford Group and will therefore have opportunity for examining its programme. May I make a plea for honest investigation and inquiry into this movement, which is undoubtedly affecting the lives of an increasing number of responsible individuals, by the usual scientific approach—namely, observation and experiment. Some of us are making for ourselves what is surely the greatest experiment of all time, and discovering the reality of Divine Will in everyday life. The results are, to say the least, more than interesting; by the application of the basic principles of Christianity personal freedom and confidence, increased efficiency, and a different type of work is produced. From this grows a new vision of the purpose of medicine—namely, that the treatment of the whole of man's threefold nature, rather than concentration on the physical aspect, is the secret of real health.

I enclose a copy of the recent publication *Drums of Peace*. This magazine can be used as a starting-point for information, and is a valuable addition to the waiting-room literature. My secretary tells me that the copies in my own waiting-room are used more than any other magazine. It is obtainable through W. H. Smith and Son's bookstalls.

I am, Sir, yours faithfully,

Folkestone, Sept. 9th. E. E. CLAXTON.

IMPAIRED GLUCOSE TOLERANCE IN ALIMENTARY DISORDERS OF CHILDHOOD

To the Editor of THE LANCET

SIR,—The paper of Dr. Wallace Ross on this subject in your issue of Sept. 5th was of great interest to me. During an extensive study of an endemic parotid enlargement (hyperplasia) in Egypt, under the supervision of Prof. H. B. Day, but not yet published, I found similar abnormalities in the oral glucose-tolerance curves (usually a flat type), yet the intravenous glucose-tolerance curves were quite normal. Our aim in doing these tests was to separate our endemic hyperplasia from another type described by Flaum[1] in latent diabetes. We found that the commonest disease associated with parotid hyperplasia in Egypt is pellagra, and we ruled out the claimed relationship between this condition and ankylostomiasis. Therefore the glucose tolerance was done on pellagra cases, either pure or complicated by parasitic infection, which is not necessarily ankylostoma. All the patients were adults, diarrhœa was present, but slight, in some, and the gastric acidity was variable; but the findings were the same in all. Similar glucose-tolerance tests were done by another worker, P. Ghalioungi (personal communication), who worked on selected cases of ankylostoma anæmia only, and identical results were obtained. I did control tests on patients of the same class as those having the parotids (farmers), but with no parotid enlargement; similar curves were obtained when there was pellagra, diarrhœa, or parasitic infestations. The conclusion was drawn that parotid enlargement in no way modifies the carbohydrate tolerance. The factor at play is a diminished absorption from the alimentary canal, either due to atrophic changes, parasite infection, or diarrhœa. The normal glucose-tolerance curves done by the intravenous route exclude any disturbance in the regulation of the blood-sugar.

The types of curves were: (*a*) a flat type, (*b*) a flat delayed type, or (*c*) a climbing type, which is common in cases complicated with cirrhosis of the liver (bilharzial) either early or advanced. These were obtained by the oral glucose-tolerance test (G.T.). (The intravenous test gave normal curves.) The following are examples:—

FLAT TYPE

	Fasting.	*30*	*60*	*90*	*120 min.*
Oral G.T. ..	85 .. 95	.. 100	.. 105	.. 98	

(Mg. per 100 c.cm.)

	Fasting.	*15*	*30*	*45*	*60*	*90*	*120 min.*
Intravenous G.T.	92 .. 174	.. 152	.. 104	.. 90	.. 85	.. 86	

(Mg. per 100 c.cm.)

FLAT DELAYED TYPE

	Fasting.	*15*	*30*	*45*	*60*	*90*	*120 min.*
Oral G.T. ..	85 ..	98 ..	108 ..	114 ..	136 ..	118 ..	113
Intravenous G.T.	80 ..	154 ..	125 ..	100 ..	92 ..	86 ..	—

(Mg. per 100 c.cm.)

CLIMBING TYPE (FLAT)

	Fasting.	*30*	*60*	*90*	*120 min.*
Oral G.T. ..	80 ..	98 ..	108 ..	120 ..	135

(Mg. per 100 c.cm.)

	Fasting.	*15*	*30*	*45*	*60*	*90*	*120 min.*
Intravenous G.T.	105 ..	210 ..	185 ..	142 ..	130 ..	102 ..	—

(Mg. per 100 c.cm.)

I should like to mention a case which gave findings opposite to those of Dr. Ross. The patient, a woman aged 35, has neither pellagra nor obesity and no parasitic infection, but a low gastric acidity and enlargement of the parotid glands. The oral glucose tolerance was diminished while the intravenous glucose tolerance was normal. The tests were repeated twice with constant results. The following were her figures:—

	Fasting.	*15*	*30*	*45*	*60*	*90*	*120 min.*
Oral G.T. ..	85 ..	—	.. 146 ..	—	.. 165 ..	186 ..	152
Intravenous G.T.	82 ..	153 ..	133 ..	95 ..	88 ..	80 ..	—

(Mg. per 100 c.cm.)

Even after spontaneous regression of her parotid enlargement the findings remained the same. Could this be a case of latent diabetes, but with a better sensitivity for non-absorbed (i.e., intravenous) glucose?

I have mentioned that the responsible factor for these abnormalities in the oral glucose-tolerance

[1] Flaum, E.: Klin. Woch., 1932, xi., 1704.

curves is probably the diminished absorption. The interesting findings characterising our cases is the normal intravenous glucose-tolerance curve in contrast to the high intravenous curve (diminished tolerance) in Dr. Ross's cases. It is well known that in pellagra the same factor of lack of absorption of carbohydrates exists as it does in his cases. Therefore, the explanation of his high intravenous curves on a lack of absorption of carbohydrates only seems unjustifiable. The improvement after the administration of liver stands against this explanation. The improvement of the glucose tolerance after treatment with glucose is expected even in diabetics.[2] I think liver treatment should be tried in the insulin-insensitive diabetics.

I am, Sir, yours faithfully,

M. R. KENAWY,
Registrar to the Medical Unit, Kasr-el-Aini Hospital.

Cairo, Sept. 10th.

ANGINA PECTORIS

To the Editor of THE LANCET

SIR,—I read with much interest the comprehensive paper on this subject by my colleague, Dr. Parsons-Smith, also the following one by Dr. Geoffrey Bourne in your issue of Sept. 5th. I would like to supplement these with brief notes of a shell-shock case which presented the symptoms of angina of a severe type and which yielded to suggestion after the failure of routine treatment.

A soldier about 30 years of age was admitted to the Heart Hospital under my care with severe anginal symptoms, the cause of which repeated examinations failed to discover; moreover, treatment gave but temporary relief. The symptoms were provoked by any attempt to get out of bed or even turn over.

As the patient was getting worse rather than better and there was a neurotic element present, it was at length resolved to try the effect of suggestion. The male ward is on the top floor and above is a roof garden. I said there was only one remedy left, but that must have his coöperation to be effective. On the following morning he was to have a subcutaneous injection after which he was to go up to the garden. The nurse was to cleanse the arm in the evening and again in the morning, leaving a dressing on until I came. ℥ xv of distilled water was injected and immediately afterwards he walked upstairs leaning on my arm. The treatment was successful and after two further weeks in the hospital he returned home to complete recovery.

Although I have had several cases of pseudo-angina such an extreme one is unique in my experience.—I am, Sir, yours faithfully,

CHARLES W. CHAPMAN,
Consulting Physician, National Hospital for Diseases of the Heart.

Sept. 15th.

PERMEABILITY OF THE SKIN

To the Editor of THE LANCET

SIR,—The annotation in your last issue draws attention once more to the therapeutic possibilities of absorption through the skin. According to Filehne, the skin is to be conceived as a "diffusion membrane," impregnated with cholesterin and coated on its external surface with fat and skin grease. Only such substances can diffuse through it as dissolve in the fluids which impregnate and coat the "diffusion membrane," or are capable of uniting with them. Modern spa treatment finds its scientific justification chiefly in the new conception of the biological function of the skin, which is no longer conceived simply as an integument, but as an active organ which influences vegetative processes through hormones and exchange of mineral substances. The influence of baths on a big surface with a close capillary network makes the favourable therapeutic results seem explicable. In Budapest, which possesses a number of natural warm springs, the medical profession has been taking much interest in the therapeutic principles involved, especially in relation to rheumatism, which is very widespread in Hungary, and lately we have had especially good experience with salicylic mud-baths. H. Kionka has pointed out that in addition to purely physical stimulation by substances dissolved in the mud-bath there are chemical effects on the body. The mud used contains a mixture of vegetable acids in colloidal form, and in the Salhumin bath, which has lately been introduced into England under the name of Husalba, a successful attempt has been made to render these acids water-soluble so that they can exert their full influence on the body. Many years' experience has shown the usefulness of such baths in acute and chronic rheumatic infections.

I am, Sir, yours faithfully,

DR. ALEX. FORBATH,
Editor of *Magyar Orvos*, Budapest.

London, Sept. 14th.

[2] Ellis, A. W. M.: Quart. Jour. Med., 1934, iii., 137.

MUSTARD PACKS

To the Editor of THE LANCET

SIR,—In the review of the book on "Hydrotherapy," by R. M. Le Quesne and M. Granville, which appeared in THE LANCET for August 8th last (p. 353), the following criticism is made:—

The statement that excessive heat prevents the liberation of the volatile oil in the preparation of mustard packs is erroneous; on the contrary, the oil is set free by excessive heat and may thus cause blistering.

From the facts available, there is no doubt that the authors of the book are correct and the reviewer is wrong. The volatile oil of mustard (allyl isothiocyonate) is produced when the enzyme myrosin reacts with the glucoside sinigrin, both compounds being normal constituents of mustard, but interacting only when water is present. Myrosin, in common with all other enzymes, is unstable towards heat, and since its presence is necessary before volatile oil can be produced, it follows that the existence of the latter depends on the temperature of the water being below that at which myrosin is destroyed—in other words, *not* excessively hot.

No definite temperature can be given at which mustard is completely "killed," but experiments have repeatedly shown that from 140° F. (60° C.) onwards, the amount of oil liberated rapidly decreases, becoming negligible as boiling-point is approached. In a bath there is not very much likelihood of the water reaching such temperature, but in the preparation of a mustard pack it is quite possible that water just "off the boil" might be used, with fatal results to the mustard. The authors' warning, therefore, seems to us not only scientifically correct but well justified.—I am, Sir, yours faithfully,

JOHN W. CORRAN,
Chief Chemist, J. and J. Colman Limited.

Norwich, Sept. 14th.

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OPENING OF THE MEDICAL SCHOOLS

In connexion with the opening of the session at the London medical schools the following arrangements have been made:—

Charing Cross Hospital

A post-graduate course for former students will be held on Oct. 3rd and 4th. The annual dinner will take place on Saturday, Oct. 3rd, at the Café Royal, at 8 P.M., with Mr. Philip Inman, chairman of the hospital, in the chair. On Friday, Oct. 2nd, at 4 P.M., Lord Iliffe will distribute the prizes and deliver an address.

Guy's Hospital

On Monday, Oct. 12th, at 3 P.M., Lord Dawson will deliver the inaugural address and present the prizes at this medical school.

King's College Hospital

On Tuesday, Oct. 6th, Dr. John Beattie will give the inaugural address at 4.30 P.M., when he will speak on the experimental method in medicine and surgery. On Saturday, Oct. 24th, and on Sunday, there will be lectures and demonstrations open to all practitioners. The annual dinner of past and present students will be held on Oct. 24th at the May Fair Hotel at 8 P.M., with Mr. H. A. T. Fairbank in the chair.

London Hospital

A post-graduate course for former students of the hospital will be held from Oct. 14th to 17th. The old students' dinner will take place on Oct. 15th, at 7.30 P.M., at the Trocadero Restaurant, with Mr. Russell Howard in the chair.

Middlesex Hospital

A post-graduate course for former students of the hospital will be held from Oct. 2nd to 4th. On Oct. 2nd the annual dinner will be held at the Savoy Hotel at 7.30 P.M., and Prof. James McIntosh will be in the chair.

Royal Free Hospital

On Thursday, Oct. 1st, at 3.30 P.M., the inaugural address will be given by Miss Elizabeth Haldane, LL.D., on Past Memories and Future Hopes. The annual reunion dinner of the old students will be held on Dec. 3rd, at 7.30 P.M., at the Savoy Hotel, with Dr. Dorothy Hare in the chair. There will be a week-end post-graduate course for former students of the hospital on Dec. 4th to 6th.

St. Bartholomew's Hospital

On Thursday, Oct. 1st, at 8 P.M., the old students' dinner will be held in the College Hall, Charterhouse-square, with Sir Charles Gordon-Watson in the chair.

St. George's Hospital

On Thursday, Oct. 1st, at 3 P.M., Sir Crisp English will present the prizes and deliver the inaugural address, under the title of Looking Forward. The annual dinner will be held on the same day at 8 P.M. at Claridge's Hotel, when Dr. Harold Spitta will be in the chair.

St. Mary's Hospital

A week-end post-graduate course will be held from Oct. 2nd to 4th, open to all medical practitioners without fee. The annual dinner of past and present students will take place at Claridge's Hotel on Saturday, Oct. 3rd, at 7.30 P.M., with Dr. J. O. Symes in the chair.

St. Thomas's Hospital

Dr. J. R. Harper will preside at the old students' dinner which will take place on Friday, Oct. 2nd, at the Dorchester Hotel at 7.45 P.M.

University College Hospital

On Tuesday, Oct. 6th, at 4 P.M., a reception will be held in the library of the medical school. The annual demonstrations for old students will take place on Oct. 8th and Oct. 9th, and the annual dinner will be held in the library of the medical school on Friday, Oct. 9th, at 7.30 P.M., with Dr. Charles Bolton, F.R.S., in the chair. The annual dinner of the Women's Association will be held at the Frascati Restaurant at 8 P.M. on the same day, and Dr. Freda Kelly will preside.

Westminster Hospital

On Monday, Sept. 28th, at 3 P.M., the winter session will open at the Caxton Hall, Westminster, when Lord Horder will deliver the inaugural address. A short course open to all medical practitioners will be held on Sept. 26th and 27th, and the annual dinner of past and present students will take place at the Trocadera Restaurant on Sept. 26th, at 7.30 P.M., when Mr. Tudor Edwards will be in the chair.

Royal Dental Hospital

Prizes will be distributed at the hospital on Tuesday, Oct. 6th, at 8 P.M., at a conversazione at which Sir William Willcox will preside. The annual clinical At Home will be held at the hospital on Nov. 21st, and the dinner of past and present students on the same evening at the Trocadero Restaurant at 7.30 P.M., with Mr. J. H. Badcock in the chair.

Further details of post-graduate courses will appear in due course in our Medical Diary.

MEDICAL NEWS

Royal Faculty of Physicians and Surgeons of Glasgow

At a meeting of the Faculty held on Sept. 7th, with Prof. Archibald Young, the president, in the chair, the following were admitted to the fellowship:—

Amiya Nath Chakraborty, M.B. (London), John Stirling Hogg, M.B. (Glasgow), Mustafa El Diwany, M.B. (London), Robert Napier, M.B. (Perth), Thomas McMurtrie Sharp, M.B. (Rothesay), and Henry Wapshaw, M.B. (Glasgow).

Epsom College: The St. Anne's Scholarship

The council of Epsom College will shortly elect a girl to a St. Anne's scholarship of £110 a year. Candidates must not be less than 9 years of age on July 15th, 1936, and must be orphan daughters of medical men who have been for not less than five years in independent practice in England or Wales. Application must be made by Oct. 15th, 1936, on a form to be obtained from the secretary of the College, 49, Bedford-square, W.C.1.

Royal Dental Hospital, London

During the autumn post-graduate courses in the following subjects will be given at this hospital: local anæsthesia, by Dr. F. St. J. Steadman (beginning on Nov. 7th); radiology, by Dr. Sydney Blackman (beginning on Oct. 7th); prosthetics, by Dr. E. Wilfred Fish (beginning on Nov. 13th); and surgical procedures, by Mr. Harry Stobie (beginning on Oct. 9th). Further particulars may be had from the secretary of the hospital, Leicester-square, London, W.C.2.

Secondary Medical Staffs in the U.S.S.R.

New types of schools and training courses have been instituted by the Soviet Government to improve the training of secondary medical personnel. It is stated that by the autumn of 1937 the new schools will have admitted 44,770 students for three years' training as medical assistants, 13,300 for two years' training as midwives, 5200 for two years' training as medical laboratory workers, and 95,000 for training as medical nurses and nurses for creches. New regulations for the training of dentists include a four-year course for stomatologists at stomatological institutes and a three-year course at dental schools for dental surgeons. Pharmacists will go through a four-year course, and assistant pharmacists a three-year course, a year of which will be in practical work. They may also be apprenticed for three years at chemists' shops and other dispensing institutions, but will be expected to pass the ordinary examinations of the pharmaceutical schools.

London Jewish Hospital Medical Society

Mr. Arnold Sorsby will deliver his presidential address to this society on Sunday, Oct. 4th, at 8.30 P.M., at 43, Great Windmill-street, Piccadilly, W. (supper at 7 P.M.). His subject will be "Physicians, Quacks, and Medical Institutions of London Jewry since the Resettlement."

Society for the Study of Inebriety

The seventeenth Norman Kerr memorial lecture will be delivered to this society on Thursday, Oct. 13th, at 4 P.M. at Friends House, Euston-road, London, N.W., by Dr. D. K. Henderson, professor of psychiatric medicine in the University of Edinburgh. He will speak on alcoholism and psychiatry.

Course in Hospital Administration

A course of lectures and demonstrations on clinical practice and in hospital administration will be given at the Brook Hospital, Shooter's Hill, Woolwich, S.E., by Dr. J. V. Armstrong on Mondays, Wednesdays, and Saturdays. The course will begin on Oct. 5th, and further information may be had from the medical officer of health of the London County Council, Public Health Department (Special Hospitals), the County Hall, S.E.1.

Food Unfit for Consumption

At the closing session of the Sanitary Inspectors' Association conference at Harrogate a resolution was approved stating that the law relating to food found to be unsound or unfit for human consumption requires amendment so as to secure: (1) the extension of Section 116 of the Public Health Act (1875) to enable the officer concerned to detain food for further inspection; (2) the extension to England and Wales of the powers possessed by some local authorities of (*a*) instituting proceedings against the original vendor or consignor of unsound food, and (*b*) the compulsory registration of all premises used for storage, preparation, and/or sale of food for human consumption, and the power to refuse such registration; and (3) adequate provision being made to enable local authorities to close unsatisfactory slaughter-houses.

Fellowship of Medicine and Post-Graduate Medical Association

The following post-graduate courses have been arranged for September and October: proctology at the Gordon Hospital (Sept. 28th to Oct. 3rd); general medicine and surgery at the Metropolitan Hospital (Oct. 5th to 10th); cardiology at the National Heart Hospital (Oct. 5th to 17th); gynæcology at the Chelsea Hospital for Women (Oct. 19th to 31st); neurology at the West End Hospital for Nervous Diseases (Oct. 19th to 24th); and dermatology at St. John's Hospital (Sept. 29th to Oct. 30th, afternoons). Week-end courses during October will be as follows: fevers at the Park Hospital, Hither Green (Oct. 3rd and 4th); surgery at the Cancer Hospital (Oct. 17th and 18th); chest diseases at the Royal Chest Hospital (Oct. 10th and 11th); and obstetrics at the City of London Maternity Hospital (Oct. 24th and 25th). On Saturday, Oct. 3rd, a special demonstration on pulmonary tuberculosis will be given at the Preston Hall Settlement. On Tuesday, Oct. 13th, Mr. R. Lindsay Rea will give a special fundus oculi demonstration for M.R.C.P. candidates, at 8.30 P.M. Detailed syllabuses of all courses can be had from the secretary of the fellowship, 1, Wimpole-street, W.1.

Medical Diary

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

BRITISH POSTGRADUATE MEDICAL SCHOOL, Ducane-road, W.

WEDNESDAY, Sept. 23rd.—Noon, clinical and pathological conference (medical). 2.30 P.M., clinical and pathological conference (surgical).

THURSDAY.—2.15 P.M., operative obstetrics.

FRIDAY.—2.15 P.M., Department of Gynæcology: Pathological demonstration.

Daily, 10 A.M. to 4 P.M., medical clinics, surgical clinics or operations. Obstetrical and gynæcological clinics or operations. Refresher course for general practitioners.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, Sept. 21st, to SUNDAY, Sept. 27th.—NATIONAL TEMPERANCE HOSPITAL, Hampstead-road, N.W. Tues., and Thurs., 8 P.M., clinical and pathological course.—BROMPTON HOSPITAL, S.W. (1) M.R.C.P. course in chest diseases, twice weekly, at 5 P.M. (2) All-day course in chest diseases.—INFANTS HOSPITAL, Vincent-square, S.W. (1) Mon., Tues., Wed., and Thurs., 8 P.M., primary F.R.C.S. anatomy and physiology course. (2) All-day course in infants' diseases.—ROYAL CHEST HOSPITAL, City-road, E.C. Mon., Wed., and Fri., 8 P.M., advanced course in chest diseases.—ROYAL WESTMINSTER OPHTHALMIC HOSPITAL, Broad-street, W.C. Sat. and Sun., course in ophthalmology.

WESTMINSTER HOSPITAL.

SATURDAY, Sept. 26th, and SUNDAY.—Clinical demonstrations (open to all medical practitioners).

MANCHESTER ROYAL INFIRMARY.

TUESDAY, Sept. 22nd.—4.15 P.M., Mr. P. B. Mumford: Eczema: Differential Diagnosis and Treatment.

FRIDAY.—4.15 P.M., Dr. A. Hillyard Holmes: Demonstration of Medical Cases.

Appointments

FRASER, M. F., M.B. Aberd., D.P.H., has been appointed Assistant Welfare Medical Officer for the County of Durham.

MILLER, J. A., M.B. Durh., District Tuberculosis Officer for the County of Durham.

TATHAM, R. C., F.R.C.S. Eng., Hon. Assistant Surgeon to the Hull Royal Infirmary.

WITHERS, R. J. W., M.D. Belf., F.R.C.S. Edin., Deputy Medical Superintendent at the Crumpsall Hospital, Manchester.

YOUNG, J. N., M.B., F.R.C.S. Edin., Hon. Surgeon to the Hull Royal Infirmary.

Manchester Royal Infirmary.—The following appointments, which we gave incorrectly last week, are announced:—

LUXTON, R. W., M.B. Manch., M.R.C.P. Lond., Medical Chief Assistant;

PARKINSON, J. S., M.B. Manch., M.R.C.P. Lond., Medical Chief Assistant;

SIMPSON, THOMAS, M.B. Leeds, Medical Chief Assistant;

HOWAT, H. TAYLOR, M.B. St. And., Medical Chief Assistant; and

GRIFFITHS, D. LL., M.B. Manch., F.R.C.S. Eng., Resident Surgical Officer.

Leeds Jewish Herzl Moser Hospital.—The following appointments are announced:—

VINING, C. W., M.D., F.R.C.P. Lond., D.P.H., Hon. Physician to the Children's Department;

BRILL, LEO, M.B. Leeds, F.R.C.S. Edin., Hon. Assistant Surgeon; and

SAMUEL, SAMUEL, M.D. Leeds., Hon. Assistant Surgeon.

Certifying Surgeons under the Factory and Workshop Acts: Dr. A. H. MUIR (Bermondsey District, London); and Dr. H. MURTAGH (Ripponden District, Yorks, W.R.).

Births, Marriages, and Deaths

BIRTHS

GREEN.—On Sept. 4th, at West Wickham, Kent, the wife of H. F. Green, M.B., of a daughter.

RIVERS-MOORE.—On Sept. 5th, at Port Shepstone, Natal, the wife of Dr. J. F. Rivers-Moore, of a daughter.

MARRIAGES

BODINGTON—ELLIS.—On Sept. 5th, at St. Andrew's Church, Cobham, Jocelyn Riviere Bodington, B. Chir., to Margaret, daughter of Capt. Ellis of Emlyn Lodge, Cobham.

GLYNN-JONES—FARR.—On Sept. 1st, at the Parish Church, Wimbledon, William David Glynn-Jones, M.R.C.S., to Effie Agnes Farr of Wimbledon.

HUNT—STOCKWELL.—On Sept. 5th, at Beaconsfield Parish Church, Richard Swinton Hunt, B.Chir., to Eveline Ethel, younger daughter of Mr. W. A. Stockwell of Beaconsfield.

KELLY—BEARE.—On Sept. 4th, at St. Martin-in-the-Fields, Laurence Murray Kelly, M.R.C.S., L.M.S., to Barbara Jean, younger daughter of the late Mr. A. T. Beare of Farnborough, Kent.

WINCKWORTH—BROADWAY.—On Sept. 9th, at St. Peter's Church, Dorchester, Richard Winckworth, F.R.C.S., to Maureen, only daughter of Dr. T. B. Broadway of Dorchester.

DEATHS

DWYER.—On Sept. 9th, at Leamington Spa, Hubert de Burgh Dwyer, M.R.C.S. Eng.

RIDGWAY.—On Sept. 9th, at Dublin, William Gerald Ridgway, F.R.C.S.I., surgeon to County Hospital, Roscommon, aged 50.

SMITH-SHAND.—On Sept. 9th, Surg. Capt. A. K. Smith-Shand, M.B., Ch.B. Edin., R.N. (retd.), of York, son of the late Prof. J. W. F. Smith-Shand, M.D., of Aberdeen University.

TATHAM.—On Sept. 12th, suddenly, Col. C. J. W. Tatham, O.B.E., late R.A.M.C., Long Melford, Suffolk, in his 76th year.

TAYLOR.—On Sept. 2nd, at Torquay, Richard Stanley Taylor, M.A., M.D. Camb., aged 84.

WILLETT.—On Sept. 8th, at Archerfield, Saltford, Somerset, George Gilmore Drake Willett, M.R.C.S. Eng., L.S.A., late of Keynsham, Somerset, in his 80th year.

N.B.*—*A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

NOTES, COMMENTS, AND ABSTRACTS

THE LONDON AMBULANCE SERVICE

By Sir William Job Collins, K.C.V.O., M.D., M.S., F.R.C.S.

Last year there were 47,634 calls for the accident section of the Ambulance Service of the London County Council. It may be worth while to record the story of the origin and development of this beneficent municipal undertaking.

In a pamphlet issued by the County Council it is remarked :—

> Although it would naturally be assumed that most people would value their lives more highly than their property, it is nevertheless true that for generations the property of Londoners has been protected, whilst it is only recently that anything has been done for those who fall ill or meet with an accident in the streets.

Ambulances were originally devised to serve the purposes of a military campaign and their utilisation in civil life was a secondary development therefrom. It was Baron Larrey who first contrived *ambulances volantes* for the *Grande Armée* under Napoleon. Originally they were spoken of as *hôpitals ambulants*, thus indicating the true nature of the service—i.e., an extension from a hospital as base to the site of the casualty.

HISTORY OF THE LONDON AMBULANCE

As in so many other instances the provision for dealing with the sick and injured in streets and public places was first conceived and undertaken by voluntary philanthropic agencies rather than as part of municipal administration. The order of St. John of Jerusalem, as modernised in 1830 and chartered as an association in 1888, afforded first-aid instruction and provided litters and stretchers at certain stations in London. It also coöperated with the Volunteer Medical Staff Corps and the police in dealing with casualties on occasions of public processions and gatherings of large numbers of persons in the streets. An attempt to inaugurate a London horsed ambulance service in 1882 was not crowned with success. Wheeled litters were, however, attached to certain cab ranks and fire brigade stations in 1889 by the generosity of the late Mr. H. L. Bischoffsheim.

Apart from the police arrangements the foregoing were the chief agencies for ministering to persons injured or taken ill in the streets or public places in London when the matter first engaged the attention of the London County Council in 1901. A subcommittee (of which I was chairman) inquired into the matter and reported in 1902 on the need of a coördinated system for dealing with street accidents under a central authority with rapid ambulances summonable by telephone. It condemned the habitual use of cabs for cases of fractured limbs and for head or abdominal injuries. The methods employed in Liverpool, Manchester, and other provincial towns, as well as in America and on the continent, were described. The police and the fire brigade were consulted but were not then prepared to undertake an ambulance service. Accordingly an improved scheme for the erection and maintenance of ambulance stations provided with motor ambulances to be called by telephone was recommended, and clauses to give effect to this recommendation were in 1906 introduced into the County Council's General Powers Bill. These clauses, supported by evidence, passed the Commons, but were struck out in the Lords on the advice of a committee over which Lord Camperdown presided, mainly on the ground that the Home Office were opposed to the scheme. In response to numerous inquiries Mr. Herbert Gladstone, then Home Secretary, announced in December, 1906, that he had appointed a committee "to inquire into the provision made for dealing with cases of accident and sudden illness occurring in streets and public places within the metropolis and to report whether any, and if so what, improvements in ambulance provision are necessary or desirable, and how they could be effected with due regard to efficiency and economy."[1] The committee held 24 sessions, examined 32 witnesses, and reported on March 1st, 1909. The unanimous finding was "that the present system is gravely defective and results in much preventable detriment and suffering by reason of transport by unsuitable means of persons who have been injured or taken ill in the streets or other public places." The report stated that street accidents had increased by 60 per cent. while the committee was sitting; that the unsuitable cab was largely used to transport the injured to hospital, and that the telephone was not employed to summon aid in cases of accident, poisoning, or parturition in public places. Meanwhile the City, with its municipal police, had adopted a rapid ambulance system summoned by telephone, as recommended in the County Council's report of 1902 and this was found to be working very satisfactorily.

While my two colleagues on the committee, Sir Kenelm Digby and Lord Stamford, were at one with me in condemning the gravely defective and haphazard system obtaining in the County of London, they disagreed with me as to the authority which should be made responsible for the improved system which we advocated. My colleagues urged that the Metropolitan Asylums Board should be the ambulance authority, while I contended that the London County Council should be entrusted with this new municipal service. Mr. Gladstone, when interrogated in the House of Commons as to what action would follow the report of his Departmental Committee, held out no hope of introducing legislation during the session of 1909. I accordingly introduced the Metropolitan Ambulances Bill to confer upon the County Council the necessary powers to establish and maintain an efficient rapid ambulance service for London. The Bill was read a second time on April 27th, 1909, and referred to a Grand Committee. An attempt was there made to substitute the Metropolitan Asylums Board for the County Council as the ambulance authority, but this was defeated by 28 to 1. The Bill obtained a third reading on August 19th, passed the Lords, and received the Royal Assent on Oct. 20th, having meanwhile enjoyed the belated blessing of the Home Office.

Although the London County Council had thus become invested with statutory powers as the ambulance authority, it was in no hurry to make them operative. Possibly owing to some extent to a change in the complexion of the Council these powers remained dormant for some five or six years. Indeed, a final attempt was made in 1913 to side-track the scheme by mobilising under the Metropolitan Asylums Board any conveyances possessed by boards of guardians or borough councils, a proposal which

[1] The members of the committee were Sir Kenelm Digby (chairman), Lord Stamford, and Sir William Collins.

was satirised by the *British Medical Journal* (July 26th, 1913) as "How not to work an ambulance service for London." Shortly afterwards it became known that if a motor ambulance were presented to the County Council they would be prepared to accept and maintain it. The Grand Duke Michael of Russia, in response to an appeal by me, generously presented a well-equipped and up-to-date ambulance which was stationed in Camden Town. From that date the service has continuously developed. A station was opened at Fulham in February, 1915, and five other stations were established before the end of the year. The ambulances were furnished with first-aid appliances, splints, bandages, blankets, hot-water bottles, oxygen cylinders, &c., and the public became familiarised with their use and highly appreciated their services. In 1919 the system was reorganised under a central administrative staff with uniformed attendants, and by 1929 there were 14 stations with 16 ambulances in commission and a total staff of 165. The same year, by the Local Government Act, the Metropolitan Asylums Board ceased to be and its ambulances (formerly horsed but now motor) for infectious diseases also came under the administration of the London County Council.

THE SERVICE TO-DAY

The whole system is now controlled from an office at the top of the New County Hall, where a central switchboard is in telephonic communication, day and night, with the several stations. As calls are received from the police or other sources directions are given to the nearest ambulance to proceed. A "turn out" does not exceed 15 seconds. Usually within six minutes the ambulance is at the site of the accident and within 15 minutes the sufferer has arrived at the hospital. Of the calls received last year 18,219 were from the police and 21,286 from the public. The number of calls received varies with the hour in the day, the day in the week, the month of the year, and the district served. Generally speaking the number is proportionate to the number of persons about in the streets. The hour of 12 to 1 P.M. has the highest record, 3 to 4 P.M. and 6 to 7 P.M. coming next. Saturday holds first place in days of the week closely followed by Monday and Friday, while July is the month of the year with the highest number of calls. In 1935 23,432 summonses were for accidents, 8557 for illness other than epilepsy, 1611 for epilepsy, and 7816 for parturition. The 25 ambulances now in commission traversed 221,630 miles last year. All attendants and drivers are qualified in first-aid and the handling of patients, and are provided with washable overalls. No charge is made for the use of a street accident ambulance.

Those who can recall the old mode of dealing with casualties in public places and the transport of the sick or injured to hospitals can realise the saving that has been effected in suffering to the patients and in the reduction of risk to life and limb by the institution of this beneficent service.

FIRST AID FOR RAND MINERS

THE Prevention of Accidents Committee of the Rand Mutual Assurance Company have recently issued a short handbook [1] on first aid in mines. It is based on Dr. L. G. Irvine's "First Aid and Rescue Work in Mines," and has been prepared with the assistance of Drs. L. G. Irvine, P. A. Peall, and W. G. Goudie. A pleasing feature of the handbook is the large number of excellent photographs which illustrate all the essential steps to be taken in first aid for injuries commonly met with in mines. The pictorial or graphic method of teaching first aid to unskilled workers has much to recommend it. For instance, no one after studying the illustrations on page 7 could fail to tie a reef knot, which so often presents difficulties to students of first aid, and, for that matter, to medical students. The methods of using the triangular bandage for its many purposes are illustrated clearly and well. The text has been cut down to a minimum, and none of the technical terms of anatomy or physiology has been used—the carotid artery being called the "artery of the neck," the femoral artery the "artery of the thigh," and so on. The section which explains the anatomical and physiological factors of the circulation of the blood is admirably brief and simple.

South African mines are well equipped for first aid, with ambulance stations at each shaft head, and also at varying levels underground. The "Regulation First Aid Box" is more elaborate than is usual in this country, and contains a supply of all the splints, sterilised dressings and triangular bandages, &c., necessary to deal with any accident that might occur in a mine. In the first-aid treatment of burns, moist picric acid lint is used. Tannic acid is replacing picric acid in this country as a first-aid dressing mainly because the former is now used in nearly all hospitals, and first-aid workers are asked to apply tannic acid so that the patients may have continuity of treatment. There is much to be said, however, for the use of picric acid in first-aid treatment of burns, because, unlike tannic acid, its solution is stable, and on the whole it is easier to apply. In the South African mines there is little danger of toxic absorption from the treatment of large areas, since the burnt areas are nearly always small, and the first-aid service is so well coördinated that very little time elapses before the patient gets expert attention on the surface.

The chapter on artificial respiration is clearly written and well illustrated. Artificial respiration becomes necessary in mines in cases of gassing, drowning, electric shock, and of suffocation caused by falls of ground. The method used in South Africa is a modification of Schäfer's which has been adopted in many countries as being the simplest and most practical method to teach to unskilled workers. In the handbook an additional photograph shows how the patient, in cases of drowning, should be lifted for a few seconds to clear the respiratory passages. The last chapter describes the methods of carrying an injured man, and especially how to overcome the difficulties inherent in rescue work in mines when men have to be brought from the inner darkness to the outer light.

[1] Elementary Practical First Aid for Miners (illustrated). Published and issued by the Prevention of Accidents Committee of the Rand Mutual Assurance Co., Ltd. 1936. Pp. 92.

PATRAQUE AND TUBERCULOSIS

FRENCH lexicographers define *patraque* as "a machine which functions poorly because it is badly made or worn out." In common parlance, however, the term is applied to the feeble and sickly, and writing in the *Revue de la Tuberculose* for June Dr. R. Burnand, of Lausanne, applies it to that large and ill-defined group of patients hitherto vaguely described as neurasthenic or neurodyspeptic. By giving this new label to valetudinarians who are apt to arouse the rather contemptuous despair of busy practitioners, he seeks to encourage a new and clearer conception of the ailment. After painting a clinical picture, as true as it is pathetic, of these patients, mostly women, who radiate a fretful gloom as they creak through a long life—and they are remarkably long-lived—he puts forward his hypothesis that half such cases are due to a tuberculous infection beginning soon after, or even before, birth, and running a mild subterranean course throughout the patient's life. Anyone who takes the trouble systematically to submit all his so-called neurasthenic patients to a fluoroscopic examination of the chest will be surprised, according to Dr. Burnand, to find

how often pleuro-pulmonary-lymphatic changes are demonstrable. A positive intracutaneous tuberculin test, a history of tuberculosis in other members of the family, and a record in the patient's own career of dry pleurisy, swollen lymphatic glands, transitory hæmoptyses, and protracted bronchites are all links in the chain of evidence connecting the patient's ailments with the tubercle bacillus. Dr. Burnand's willingness to accept diabetes, anæmia, and other constitutional diseases as the causes of *patraqueria* in a proportion of cases gives force to his main thesis, since it shows that he is not one of those who see tuberculosis in every deviation from the normal.

WORMS AND "APPENDICITIS"

ROUNDWORMS and threadworms as a cause of appendicitis symptoms are the subject of a warning by Paniello, Jimenez, and Guernica (Arch. de med. infantil, Cuba, 1936, v., 284), who urge that examination of the fæces should never be omitted when there are colicky or appendicular symptoms in childhood. By way of illustration they cite the case of a child two years old, admitted to hospital very ill, with a three months' history of diarrhœa and wasting. The abdomen was slightly distended and tender, the tenderness being greatest in the neighbourhood of McBurney's point, and the fæces contained numerous ova of *Ascaris lumbricoides* and of trichocephalus, besides entamœbæ. Diarrhœa continued, with the passage of blood and mucus, and despite treatment—which included blood transfusion and the administration of santonin, Dover's powder, and emetine—death followed in ten days' time. At autopsy the intestine was found to contain ten roundworms with large numbers of threadworms, and the mucous membrane was hyperæmic, with patches of acute inflammatory infiltration. The appendix was swollen, stiff, and elongated, and contained one ascaris and numerous trichocephalidæ; its mucosa was inflamed.

THE SAFE WAY TO HEALTH

THE Health and Cleanliness Council have issued for wide distribution a poster, with a forward-looking eye to the Empire Health Week which has been arranged for Oct. 4th–10th. The poster cannot escape attention; it depicts Belisha beacons erected at a crossway with conspicuous metal studs, and the crossway bears in capitals the words "Cleanliness," while the legend below is "Where there's dirt there's danger." The Council, which can be addressed at 5, Tavistock-square, W.C.1, have a number of copies available for free distribution.

CORRIGENDUM.—In an advertisement of Ostermilk, supplied to us by Glaxo Laboratories Ltd. and published in our last issue, the iron content of Ostermilk No. 2 was given as "5 pints per million" instead of "5 parts per million."

Vacancies

For further information refer to the advertisement columns

Ashford, Kent, Grosvenor Sanatorium.—Res. H.P., at rate of £100.
Battersea General Hospital, Battersea Park, S.W.—Part-time Cas. O., at rate of £50.
Birkenhead Municipal Hospital.—Sen. Res. M.O., £350.
Birmingham Children's Hospital.—First Asst. to Ear and Throat Dept., £450.
Birmingham, Dudley-road Hospital.—Jun. M.O., at rate of £200.
Bradford Children's Hospital.—H.S., £100.
Brighton, Sussex Eye Hospital.—H.S., at rate of £150.
Bristol Royal Infirmary.—Asst. to Cancer Research Dept., £300.
Burnley Victoria Hospital.—H.S., at rate of £150.
Caernarvonshire and Anglesey Infirmary.—Jun. H.S., at rate of £100.
Cambridge, Addenbrooke's Hospital.—H.P., also H.S. to Special Depts., each at rate of £130.
Canterbury, Kent and Canterbury Hospital.—H.S., at rate of £125.
City of London Hospital for Diseases of the Heart and Lungs, Victoria Park, E.—H.P., at rate of £100.
Derbyshire Hospital for Sick Children.—Res. H.P., at rate of £130.
Durham, Seaham Hall Sanatorium, &c., Seaham Harbour.—Jun. Res. M.O., £200.
Eastbourne, Royal Eye Hospital, Pevensey-road.—H.S., £100.
Evelina Hospital for Sick Children, Southwark, S.E.—H.P., at rate of £120.
Forest Gate Hospital, Forest-lane, E.—Second Asst. Res. M.O., £350.
Grimsby and District Hospital.—Jun. H.S., £150.
Halifax Royal Infirmary.—Res. Surg. O., at rate of £250.
Home Office, Whitehall, S.W.—Asst. Medical Inspector for Children's Branch, £550.
Hospital for Sick Children, Great Ormond-street, W.C.—Part-time Surg. Reg., £200. Half-time Out-patient Med. Reg., £175. Also Res. H.P. and Res. H.S., each at rate of £100.
Hospital of St. John and St. Elizabeth, 60, Grove End-road, N.W.—Res. H.S., at rate of £75.
Hostel of St. Luke, 14, Fitzroy-square, W.—Res. M.O., at rate of £200.
Hull Royal Infirmary.—Res. Surg. O., £200.
Jersey General Hospital and Poor Law Infirmary.—Asst. Res. M.O., at rate of £150.
Leeds City.—Temporary Maternity and Child Welfare Officer, £250 for six months.
Leicester, City Mental Hospital, Humberstone.—Second Asst. M.O., £600.
Lincoln, Bracebridge Mental Hospital.—Jun. M.O., £350.
Liverpool, David Lewis Northern Hospital.—Med. Reg., £125.
Liverpool, Fazakerley Sanatorium.—Res. Asst. M.O., £200.
Liverpool, Stanley Hospital.—H.S., at rate of £100.
London County Council.—Asst. M.O.'s for Mental Services, each £470. Also Asst. M.O.'s, Grades I. and II., for Infectious Diseases, each £350 and £250 respectively.
London Hospital, E.—Surgical First Asst. and Reg., £300. Also First Asst. and Reg. to Ear, Nose, and Throat Dept., £150.
London Lock Hospital, 283, Harrow-road, W.—Res. M.O. to Female Dept., at rate of £175.
Lowestoft, St. Luke's Hospital.—Sen. Asst. M.O., £500.
Manchester, Ancoats Hospital.—Res. M.O., at rate of £150. Also H.S., at rate of £100.
Manchester, Crumpsall Hospital and Institution.—Sen. Res. M.O., £400.
Manchester Ear Hospital, Grosvenor-square, All Saints.—Res. H.S., £120.
Margate and District General Hospital.—Res. M.O., £150.
Nelson Hospital, Merton, S.W.—Two Res. H.S.'s, at rate of £100.
Newcastle General Hospital.—H.S. and H.P., at rate of £150.
Newport, Mon., Royal Gwent Hospital.—H.P., at rate of £150. Also three H.S.'s, two Cas. O.'s, each at rate of £135.
Norwich, Norfolk and Norwich and Jenny Lind Hospitals.—Registrar to Orthopædic Depts., £500.
Nottingham General Hospital.—H.S. for Ear, Nose, and Throat Dept.
Plaistow Fever Hospital.—Jun. Asst. M.O., £300.
Plymouth, Prince of Wales's Hospital.—H.S. for Lockyer-street Hospital, at rate of £150.
Preston and County of Lancaster Royal Infirmary.—Cas. H.S., £150.
Prince of Wales's General Hospital, N.—Hon. Physician to Dept. of Physical Medicine.
Princess Elizabeth of York Hospital for Children, Shadwell, E.—Asst. Surgeon to Ear, Nose, and Throat Dept.
Queen Mary's Hospital for the East End, Stratford, E.—Dermatologist.
Reading, Royal Berkshire Hospital.—H.P., at rate of £125.
Richmond, Surrey Royal Hospital.—Sen. and Jun. H.S., at rate of £150 and £100 respectively.
Rotherham Hospital.—H.P., £180.
Royal Cancer Hospital, Fulham-road, S.W.—Sen. Asst. Radiologist, £350.
Royal Chest Hospital, City-road, E.C.—Hon. Physician.
Royal Eye Hospital Medical School, St. George's Circus, S.E.—Research Scholarship, £100.
Royal Eye Hospital, St. George's Circus, S.E.—Clin. Asst.
Royal Free Hospital, Gray's Inn-road, W.C.—Anæsthetic Registrar, £100.
Royal London Ophthalmic Hospital, City-road, E.C.—Asst. Surgeon.
St. Bartholomew's Hospital, E.C.—Asst. Surgeon, £750.
St. Pancras Dispensary, 39, Oakley-square, N.W.—Hon. Physician.
Samaritan Free Hospital for Women, Marylebone-road, N.W.—H.S., at rate of £100.
Sheffield Children's Hospital.—H.S., at rate of £100.
Sheffield, Jessop Hospital for Women.—H.S., at rate of £100.
Sheffield Royal Infirmary.—Clin. Asst. to Ophth. Dept., at rate of £300.
Shrewsbury, Royal Salop Infirmary.—Res. H.P. and Res. H.S., each at rate of £160.
Stoke-on-Trent, Stanfield Sanatorium.—Tuber. O. and Med. Supt., £650.
Taunton and Somerset Hospital.—H.P., at rate of £100.
Torquay, Torbay Hospital.—H.S., £175.
Wakefield City.—Jun. Asst. M.O., £500.
Walsall General Hospital.—H.P. and Res. Asst. Pathologist and H.S., each at rate of £150.
Warrington Infirmary and Dispensary.—Third Resident, at rate of £150.
Warwick City.—Jun. Asst. M.O. for P.H. Dept., £500.
Warwickshire and Coventry Mental Hospital, Hatton.—Jun. Asst. M.O., £350.
Western Ophthalmic Hospital, Marylebone-road, N.W.—Sen. and Jun. Res. H.S.'s, at rate of £150 and £100 respectively.
West London Hospital, Hammersmith-road, W.—Hon. Asst. Radiologist (Diagnosis).
Wigan, Royal Albert Edward Infirmary and Dispensary.—H.S., at rate of £150.
Wolverhampton and Midland Counties Eye Infirmary.—Registrar, £250.
Wolverhampton, New Cross Hospital.—Res. Asst. M.O., £200.
York Dispensary.—Res. M.O., £175.